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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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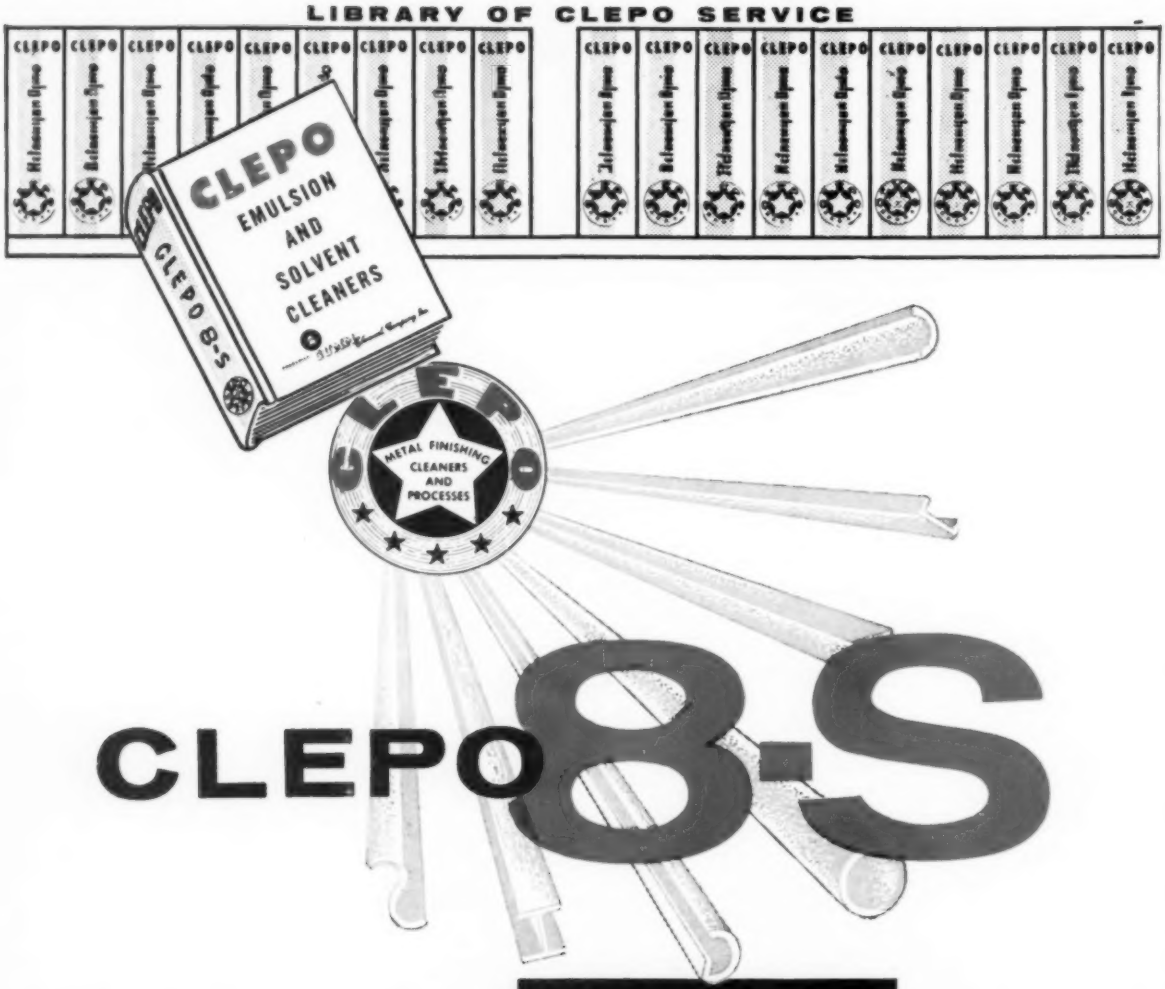

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- ★ cleaning in spray-type or tumble-type washing machines.
- ★ cleaning large pieces too heavy to handle or to immerse in a tank; it's applied directly to the surface with brush or swab and then hosed off.
- ★ cleaning paint brushes.

These are suggestions as to how CLEPO 8-S can help keep both work and equipment clean of grease, oils, polishing compounds, dirt and smut. There are other uses for CLEPO 8-S and there are other CLEPO Solvents and Solvent-Emulsion Cleaners to do other work.

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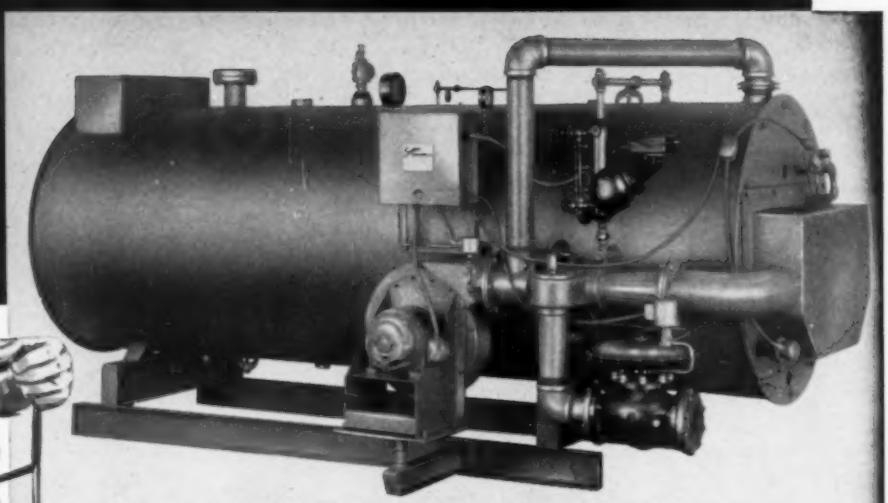

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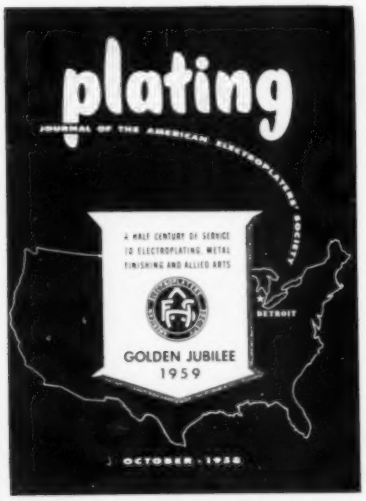

Cover Designed by James A. Civille.

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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

October 1958 — Vol. 45, No. 10

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by W. H. Safranek and C. L. Faust

Modern Organic Finishes—With Special Emphasis on Coatings for High Temperature and Abrasive Protection 1038
by M. A. Glaser and E. J. Bromstead

Plating a Bumper Crop 1046
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Published by the American Electroplaters' Society, Incorporated, 445 Broad Street, Newark 2, N. J. Phone: HUmboldt 2-3400. Yearly subscription for Members $2.00. Nonmembers U. S. and Canada $5.00. 65c a copy. Foreign, $8.00 a year. $1.00 a copy.

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PLATING is indexed in Applied Science and Technology Index and abstracted regularly in Chemical Abstracts, Metals Review, Metallurgical Abstracts, Engineering Index, Technical Data Digest, and Bulletin Analytique.

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HARSHAW CYNOREX Copper Plating Process

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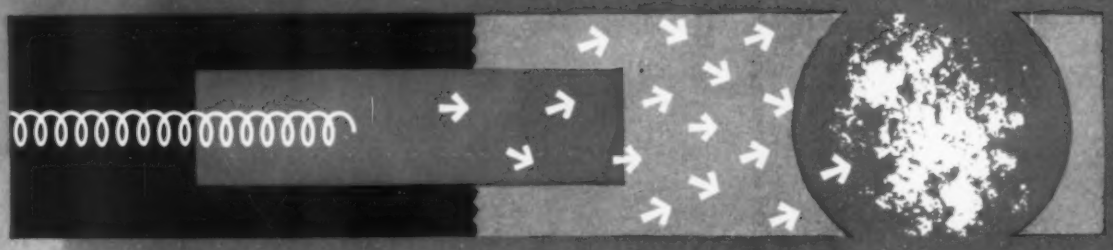
The Harshaw CYNOREX copper process is a new high speed copper cyanide bath which produces a bright and ductile copper by the use of a single addition agent designated as CYNOREX No. 1. It has many advantages including unusual brightness; a smooth fine grain and ductile deposit; stability; high efficiency; economical operation; and high tolerance to metallic impurities. The process can also be operated with air agitation.

The CYNOREX process is easy to maintain and operate because it has only one brightening addition agent. It is a non-metallic addition agent which is very stable and is not removed by carbon circulation. Since the brightener is not removed by carbon and the cathode and anode current efficiencies of the bath are 100%, operational costs are kept to a minimum. Because of the stability of the single brightening addition agent, the CYNOREX bath will produce satisfactory bright deposits even after extremely long periods of shutdown. A compatible wetting agent is available where operating conditions dictate its use.



HARSHAW CUPREX Copper Plating Process

(Acid Copper)

Among the advantages of the new CUPREX acid copper process are its superior brightness, excellent leveling, ductility, and stability. Also, the bath can be operated not only as a still or cathode rod agitated solution but also with air agitation. Another distinctive advantage of this process when operated still or with cathode rod agitation is that a cyanide copper strike is not required for adhesion of the copper to the base metal. As an air agitated solution the normal copper or nickel strike is required. The bath has indefinite operational life and therefore, the problem of treatment cleanups is at a minimum. In this respect CUPREX is superior to other bright acid copper plating processes.

The bright throwing power of the CUPREX copper bath is superior to any competitive acid copper plating solution. The deposit is the most easy to buff of any acid copper plate because of its great leveling and hiding power. Nodular build up in all instances is characteristically at a minimum.

The CUPREX process yields a deposit having a high ductility thru the entire range of conditions and compositions used to vary the deposit from an excellent semi-bright to the fully bright appearance so easily obtained.

Each of these new outstanding Harshaw Bright Copper Plating Processes has certain unusual characteristics which fit into the product finishing requirements in your plant.

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EDITORIAL

PROPINQUITY

EVERYONE WHO LOVES THE RICHNESS of the English language is occasionally dismayed by the neglect of useful words which become archaic. Sometimes these are adequately replaced by a slang phrase and sometimes a new word is coined which has, as its only merit, the fact that it is easy to understand. Generally, the new word does not carry with it the more subtle shades of meaning of the old nor is it as beautiful to hear or use.

Propinquity means nearness. It may mean nearness of kinship, nearness of place, nearness in time, but the meaning we wish to consider at the moment is nearness of ideals and interests. A recently coined substitute is the word "togetherness"!

If one considers the objectives of our Society as stated in the preamble to its constitution, he realizes that propinquity is the base rock of the association. Celebrating our Fiftieth Anniversary, we recognize that the Founders must have shared a similarity in interests, ideals and principles. The mere fact that the Society has shown such vigor and continued growth is proof that the generations of members which followed had a certain degree of propinquity.

As we start the second half of the first century of the AES, we can ask ourselves: What more can be done to foster similar principles and interests among the members? At the Branch level the degree of propinquity is excellent. There is nearness of place and nearness of time in addition to a general similarity of business interests in a given locality. At the national level, there seems to be room for improvement. A major step towards this goal is being taken with the spread of the custom of holding regional meetings. In the season 1958–9, there are going to be five such assemblies in various parts of the country. Since a larger and more interested audience is guaranteed, the quality of the technical programs is apt to be superior to that of the average Branch meeting.

It is hoped that more Branches will work together in regional groups so that every member will be able to attend his regional educational session and dinner even if he cannot get to the national convention. Doing this will increase propinquity by broadening contacts at the regional level. One by-product can be very valuable to the Society. Regional meetings give more members the opportunity to work on committees. This activity can be viewed as excellent training for future service on national committees. A greater pool of competent and interested people will thus be created from which the Society can draw the new blood needed year after year to vitalize the all-important national committees.

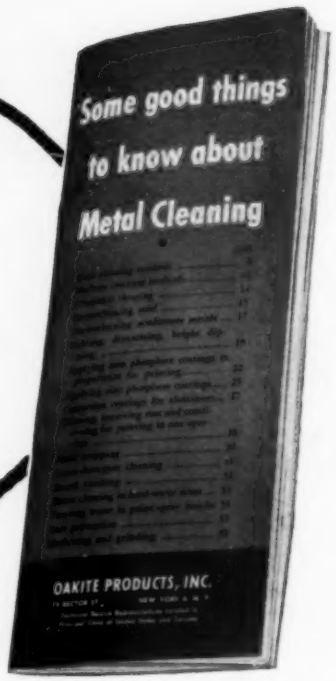
The aims of the Society cannot be achieved by Branch activities alone. The propinquity of Branch members must spread into a propinquity of all members.

W. A. Wesley

Second Vice President

◀ INDICATE A 1003.

WHICH METAL-CLEANING JOBS WOULD YOU LIKE TO IMPROVE?



¶ Are you cleaning metal in the most economical way? *See page 9 of Oakite's FREE booklet on Metal Cleaning.*

¶ Are you cleaning metal the fastest way? *See page 12.*

¶ Do you need room-temperature cleaning combined in one operation with temporary rustproofing? *See pages 12 and 14.*

¶ Do you know the advantages of *alkaline* pickling? *See page 21.*

¶ Have you compared the values of iron phosphate coating and zinc phosphate coating in preparation for painting? *See pages 22 and 25.*

¶ Can you use a cleaner that removes rust and oil at the same time; often eliminating all need for pickling? *See page 30.*

¶ Do you have trouble stripping epoxy resins, pigment residues, phosphate coatings and under-paint rust? *See page 31.*

¶ How do you clean parts that are too large to be soaked in tanks or sprayed in machines? *See page 31.*

¶ Are you getting full profit out of your finishing barrels? *See page 32.*

¶ What do you do when oversprayed paint neither floats nor sinks in your paint spray booth wash water? *See page 35.*

¶ Do you need better protection against rusting in process or in storage? *See page 37.*

Here is the full table of contents of Oakite's 44-page illustrated booklet called "*Some good things to know about Metal Cleaning*".

Tank cleaning methods
Machine cleaning methods
Ultrasonic cleaning
Electrocleaning steel
Electrocleaning nonferrous metals
Pickling, deoxidizing, bright dipping
Applying iron phosphate coatings in preparation for painting
Applying zinc phosphate coatings
Conversion coatings for aluminum and zinc
Cleaning, removing rust and conditioning for painting in one operation
Paint stripping
Steam-detergent cleaning
Barrel finishing
Better cleaning in hard-water areas
Treating water in paint spray booths
Rust prevention
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PLATING MAGAZINE's parent, American Electroplaters' Society (AES), is currently observing its Fiftieth Anniversary, and the full year's observance, launched July 1, 1958, is gaining momentum from every standpoint.

LED by 50 AES Branches in the United States supplemented by 5 in Canada and 3 in Australia, the Golden Jubilee is targeted for large educational and institutional impact.

AND not only will AES's year-long Fiftieth Anniversary observance be climaxed by its Golden Jubilee Convention and Industrial Finishing Exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing, to be held in Detroit, June 15-19, 1959 with the AES's Detroit Branch as host, but also by PLATING MAGAZINE's Golden Jubilee issue to appear in June 1959.

THIS Golden Jubilee Issue, a unique feature edition, will be beamed both for immediate interest and value to PLATING's global circulation and for long retainment by its readership as an AES reference source and as a memento of the Society's arrival at its half-century milepost of service to electroplating, metal finishing and allied arts.

IMAGINE the arresting power, merchandising strength and remembrance value afforded to company product and institutional advertising by such a unique issue.

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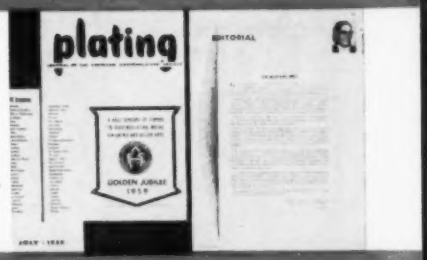

As a medium for penetrating the vast purchasing power in the electroplating, metal finishing and allied arts market with YOUR product's merchandising story, PLATING MAGAZINE offers the largest paid circulation in this field, and the lowest advertising rates.

PLATING travels deep into plants and meets the key personnel necessary for the consummation of sale. It reaches this key personnel individually, intimately, for a minimum cost because so many of them are members of the AES, PLATING's parent.

Besides numerous unsolicited non-member subscribers who spontaneously purchase (and renew) annual subscriptions, and by far the smallest unpaid circulation in this field, PLATING is received monthly, year-after-year, by every Active Member and Member-at-Large, and by every Sustaining Member company of the AES, a large and steadily increasing family.

From president to foremen, the responsible electroplating, metal finishing and other company personnel in the United States, Canada, Australia and elsewhere who are individual members of the AES are consequently *paid subscribers* of PLATING. Their annual AES membership includes their annual PLATING subscription. PLATING is their journal—originated by them—tailored by publishing experts specifically to serve them.

Make the cover-to-cover comparison as to appearance, content, effectiveness—compare its ABC Statements with others as to range and stature of coverage—compare its advertising rates as to cost. Try PLATING and be sure as to values.

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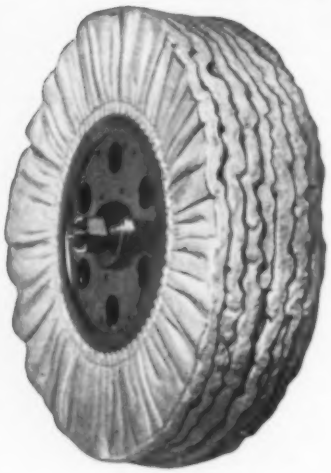

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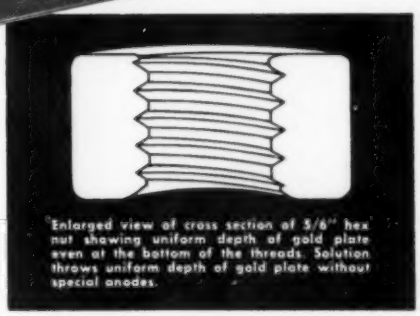

Enlarged view of cross section of 5/8" hex nut showing uniform depth of gold plate even at the bottom of the threads. Solution throws uniform depth of gold plate without special anodes.

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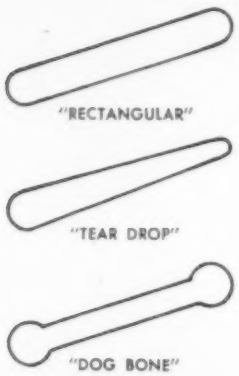

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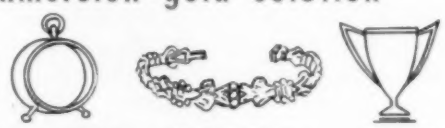

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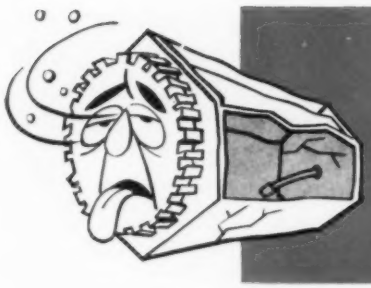

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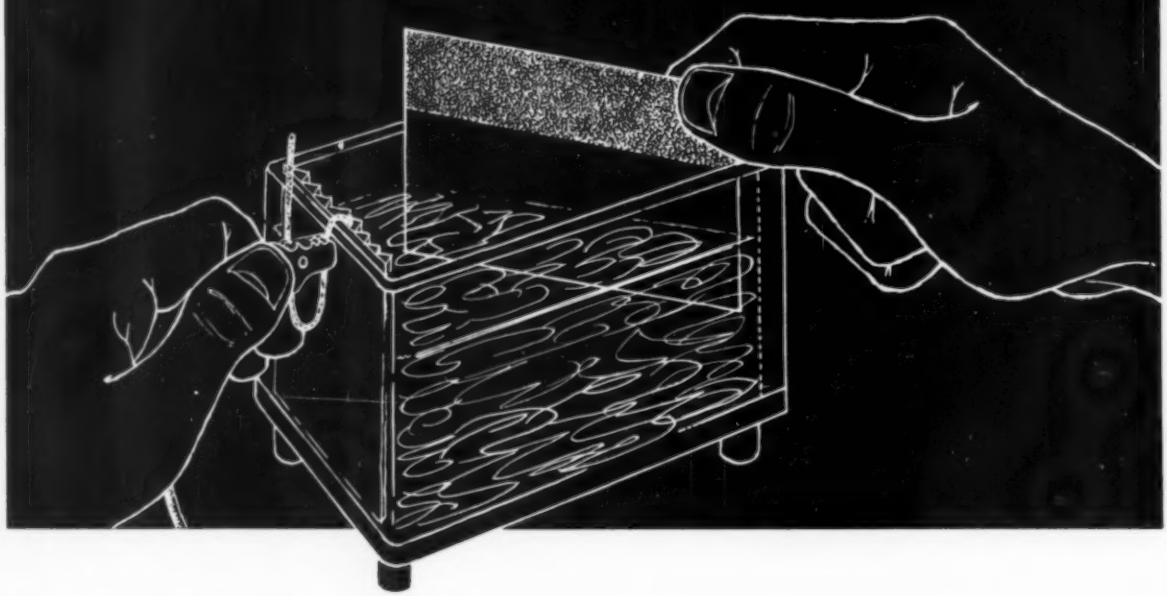

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For unequaled, perfect Cadmium Plating . . .
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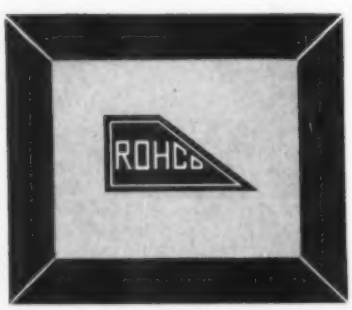
For brilliant, low cost Zinc Plating . . .
ROHCO 100 BARREL ZINC BRIGHTENER
ROHCO 503 STILL AND AUTOMATIC ZINC BRIGHTENER

For retained beauty and added corrosion resistance . . .
RODIPS CD-3 AND CD-4 ON CADMIUM PLATE
RODIPS ZN-22 AND ZN-30 ON ZINC PLATE

Profit-making, successful platers are getting superb quality with preferred ROHCO Products. They know in today's competitive market nothing but the finest finishes can continually bring in repeat business from satisfied customers.

With the use of ROHCO Products, highest quality and absence of rejects are a matter of course in daily production. Keep in mind that these products must have a wide latitude of operation and ease of maintenance to earn the ROHCO Trade Mark.



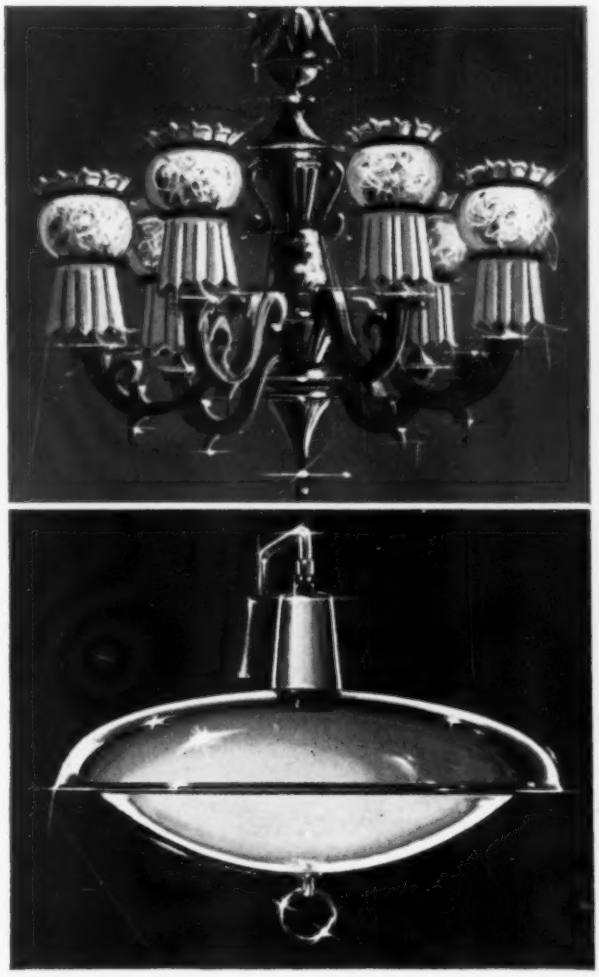
Your Nearby ROHCO Representative is eager to work with you . . .

Nationwide Stockpoints

R. O. HULL & COMPANY, INC.
1302 Parsons Court • Rocky River 16, Ohio

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1009.

Since the days of the ornate chandelier



A shining, luxurious chandelier was much admired back in 1910. Its lustrous finish added elegance to any room. But that luster caused manufacturers plenty of problems—finishing problems that had to be solved efficiently and economically. For the solutions, manufacturers turned to Acme. And they're still relying on Acme engineers for the answers.

Reduction of costly rejects, increased volume of production, complete machine finishing of odd-shaped pieces . . . these are a few of the solutions Acme engineering has provided.

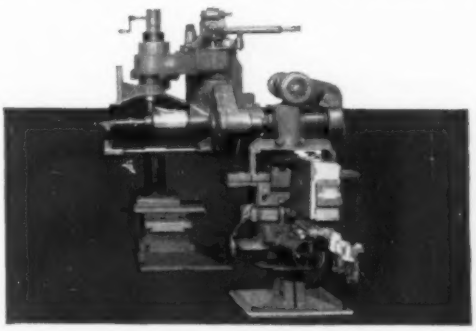
Today Acme progressive engineering builds equipment to polish and buff metal faster—and better, too. And at lower cost, because Acme engineers combine standard units with a wide variety of accessories to make *custom* machines.

Every year of its history, Acme has solved new finishing problems for many industries and manufacturers. Let us help you solve *yours*.

ACME MANUFACTURING COMPANY

1400 E. 9 MILE ROAD, DETROIT 20, MICHIGAN

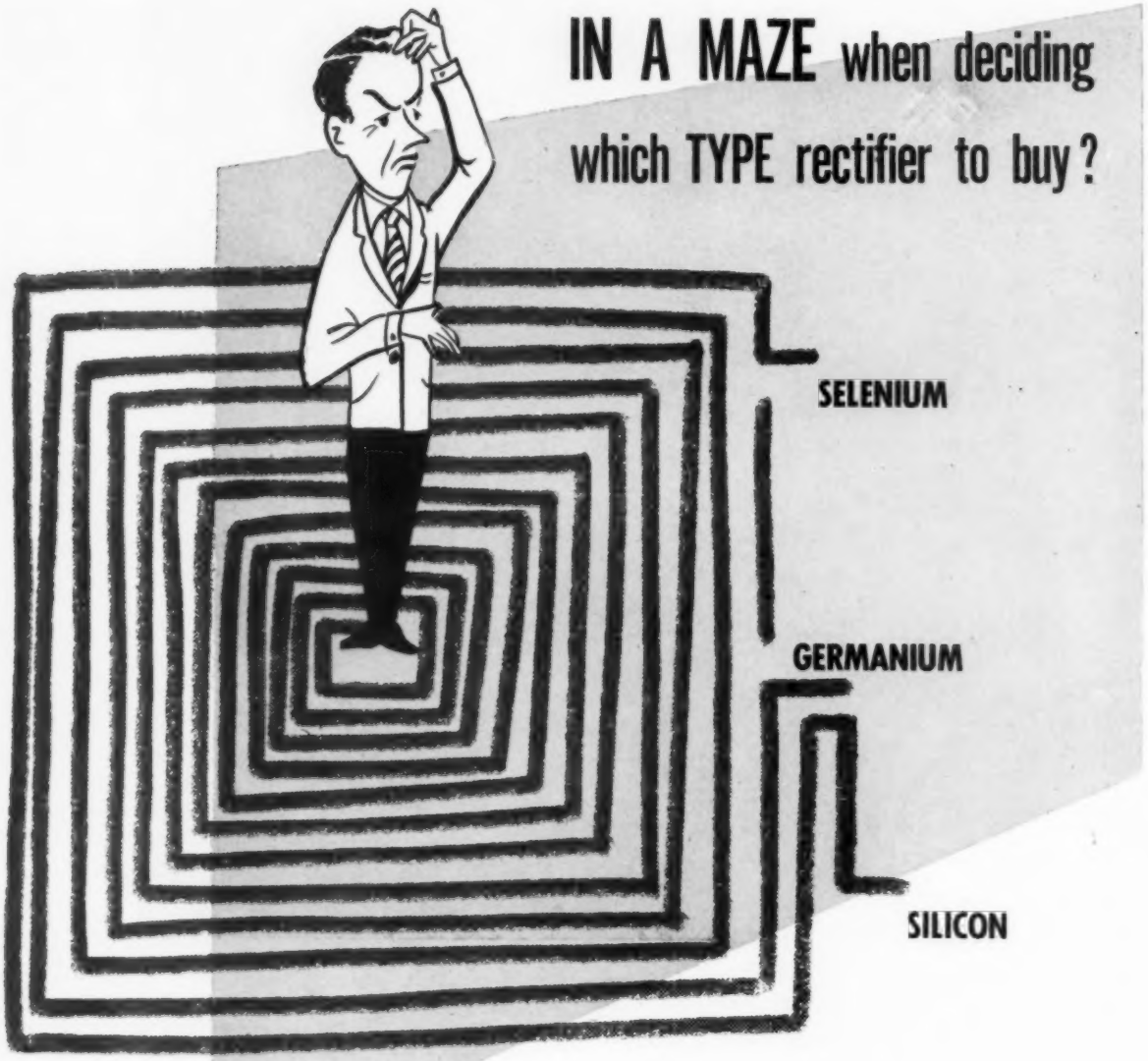
LEADING PRODUCERS OF AUTOMATIC POLISHING AND BUFFING EQUIPMENT SINCE 1910



Acme special semi-automatic machine with E-10 oscillating fixture arrangement used with Acme G-3 buffing lathe. One operator normally handles two units for most efficient production.

LET ACME *Polish Off* YOUR FINISHING PROBLEMS

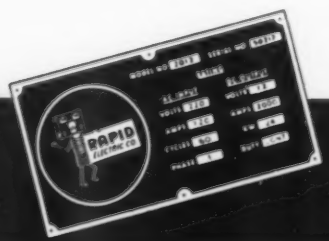
FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A 1010.



Why not call RAPID'S engineering department with your power requirements. Let us match your requirements with the right type rectifier.

Because each semi-conductor has advantages to offer, and because RAPID supplies *all three*, you can be certain of obtaining sound technical advice.

Call TA 8-2200 for reliable technical service.



THE NAMEPLATE THAT MEANS *"More Power to You!"*

RAPID ELECTRIC COMPANY

12838 Fenkell Avenue • Detroit 27, Mich. • Diamond 1-8537

2881 Middletown Road • New York 61, N. Y. • TAlmadge 8-2200

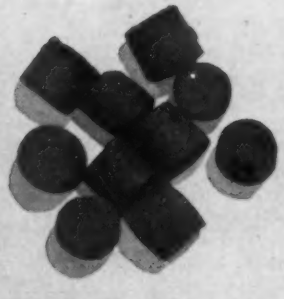
NEW

PRECISION-CONTROLLED TUMBLING MEDIA

for faster... more uniform barrel finishing at low cost

ALUMINUM OXIDE NUGGETS

Provide a fast cutting action for grinding, deburring, and polishing and require no breaking-in period. Their long-wearing qualities help minimize the problem of lodging in parts.

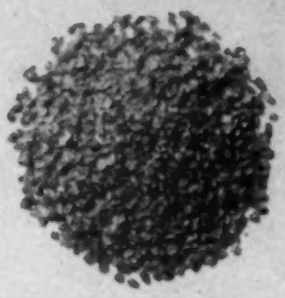


ALUMINUM OXIDE VITRIFIED PELLETS

Controlled bonded shapes formulated to give maximum "cut" with minimum wear. They are particularly advantageous where lodging must be prevented and where a rapid rate of cut is desired.

"CARBO-RUBS" RUBBER BONDED MEDIA

Parallelogram-shaped rubber bonded media. They are used primarily where the burr is light and action must be gentle. Used to produce a high "color" and to remove burrs from non-ferrous parts.



ALUMINUM OXIDE GRAIN

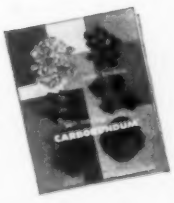
Designed for the economical finishing of small metal parts. Also used as an additive to augment the cut of various other tumbling media. Coarser sizes are used in the new "spinner-type" finishing equipment.

"CARBO-BRITE"

An electric furnace product having a fine crystalline structure and slow wearing qualities which adapt it to burnishing operations where high color is desired.

Manufacturers of metal parts which require deburring, scale removal, polishing, honing, blending, or burnishing operations can now produce finer finishes *at lower costs* by using the new *precision-controlled* Tumbling Media by CARBORUNDUM. New improvements in the manufacture of abrasive media at CARBORUNDUM assure exceptionally high output per barrel with absolute uniformity of parts and finishes. Even unusual shapes and sizes can be mass-finished to precision tolerances...at a fraction of the time and cost. CARBORUNDUM's wealth of abrasives know-how is available to assist you in working out your own parts finishing problems.

Write for this
FREE
Booklet



A practical guide describing barrel finishing of metallic parts on a mass production basis with Tumbling Media by CARBORUNDUM.

THE CARBORUNDUM COMPANY
Dept. PL 83-817, Niagara Falls, New York

Tell me more about "Precision-controlled" Tumbling Media.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

FOR EXPERT ADVICE... Ask the Man From

CARBORUNDUM

REGISTERED TRADE MARK

EXTRA SAVINGS WHEN...

ALCOA ALUMINUM BUS CONDUCTOR DOES DOUBLE DUTY AS STRUCTURAL COMPONENT

Several significant savings were effected by Master Anodizers and Platers, Inc., when they chose bus conductor of Alcoa® Aluminum for a new anodizing rack in their Bedford, Ohio, plant.

There were savings in initial cost: compared to a comparable copper system, they got the same conductivity from approximately half as many pounds of metal. Savings in installation costs: aluminum's light weight made it easy to handle and fabricate. Finally, there were savings in structural components: the 7-in. channel bus also serves as the support for the anodizing rack.

These savings are typical with bus conductor of Alcoa Aluminum. A wide variety of bus conductor sizes and shapes is available from Alcoa. Immediate delivery of rectangular bus conductor in popular sizes is available from your Alcoa Distributor. Call him before completing plans for plant modernization or expansion. Or write: Aluminum Company of America, 2313 K Alcoa Building, Pittsburgh 19, Pennsylvania.

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Brace-Mueller-Huntley, Inc.
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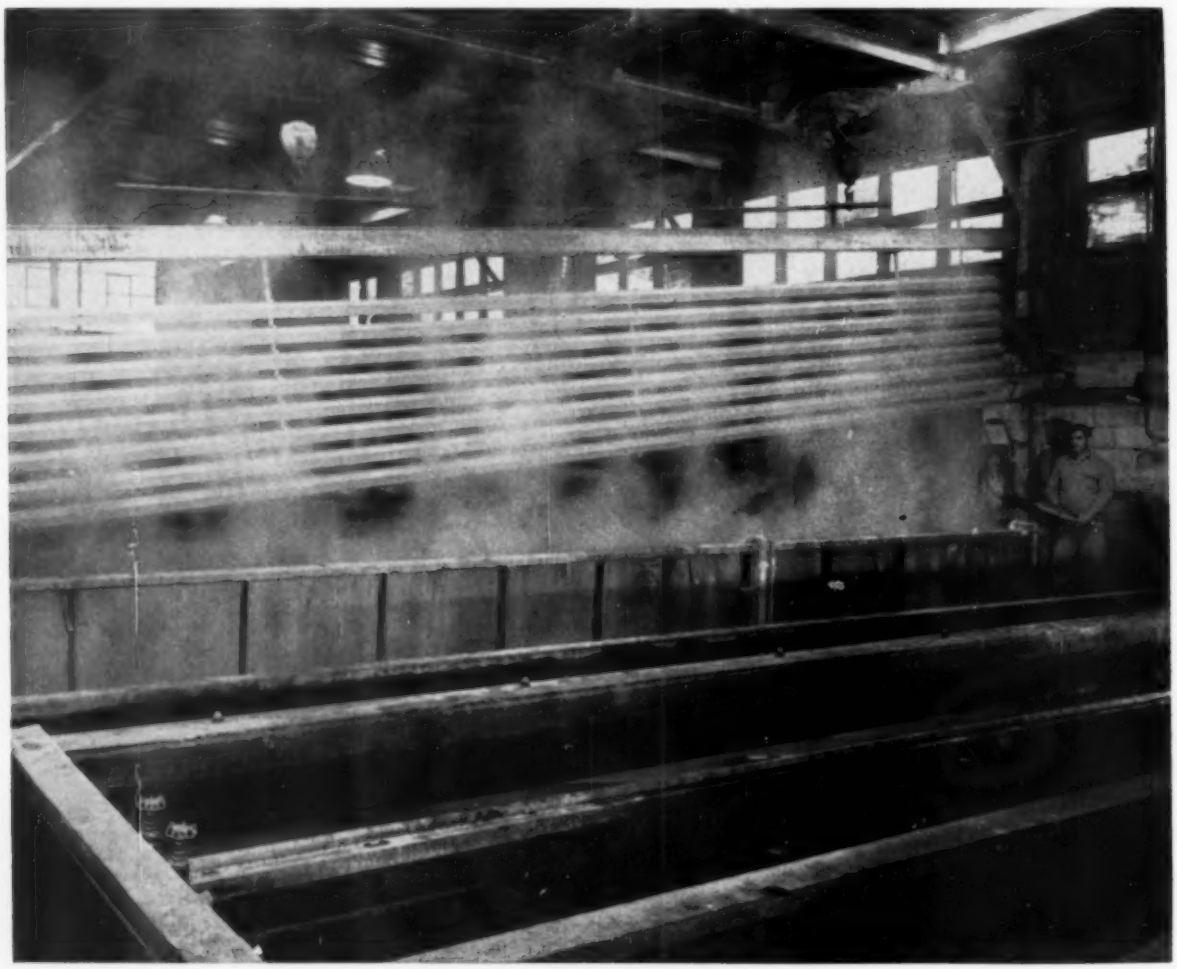
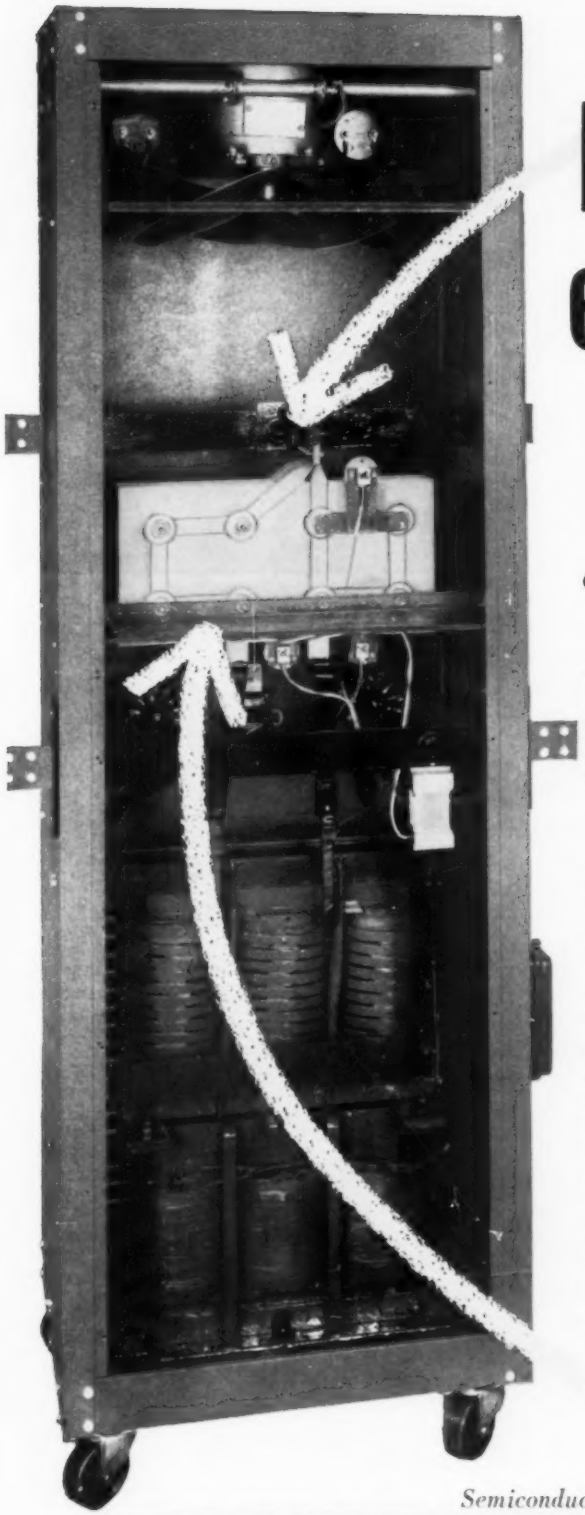
ALCOA ALUMINUM
ELECTRICAL CONDUCTORS AND ACCESSORIES

Your Guide to the Best In Aluminum Value

ALCOA THEATRE
Fine Entertainment
Alternate Monday Evenings

Double duty: Alcoa Aluminum Bus Conductor is serving as a support for this anodizing rack, while conducting 5,000-amp power for the operation.





For increased efficiency and longer life

at the heart of your plating equipment

talk to your rectifier supplier about...

Radio Receptor hcd* petti-sel

Selenium Rectifiers *high current density

Buy rectifier *performance* for ideally functioning plating equipment – not just a lot of space-consuming square inches. Petti-Sel high current density rectifiers are now revolutionizing the manufacture of power supplies for plating in this country as they've been doing in European applications for a long time. Once installed you can forget them because they're trouble free.

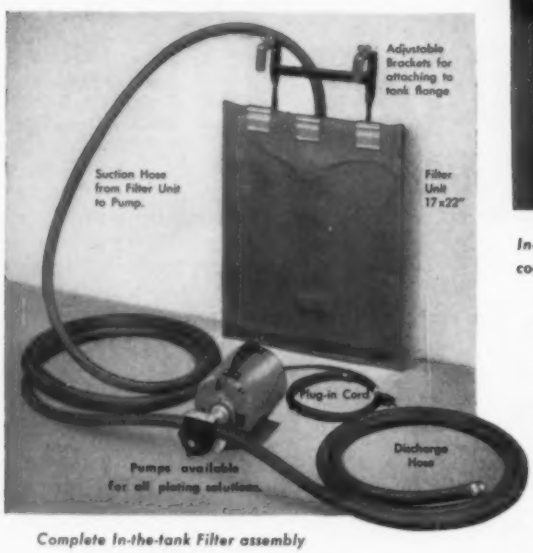
A development of the famous Siemens of Germany, Radio Receptor produces them exclusively in the U. S. Their outstanding characteristics are not even approached by any standard rectifiers available today. When you need new plating equipment, make sure it's *really* modern. See that the power supply contains HCD Petti-Sel Rectifiers! Literature upon request.

Semiconductor Division
RADIO RECEPTOR COMPANY, INC.
Subsidiary of General Instrument Corporation
240 Wythe Avenue, Brooklyn 11, N. Y., EVergreen 8-6000

General Instrument Semiconductors

GENERAL INSTRUMENT CORPORATION ALSO INCLUDES
AUTOMATIC MANUFACTURING DIVISION • F. W. SICKLES DIVISION
MICAMOLD ELECTRONICS MANUFACTURING CORPORATION (SUBSIDIARY)

New BELKE In-the-tank Filter for plating solutions


Adjustable Brackets for attaching to tank flange
Suction Hose from Filter Unit to Pump.
Filter Unit 17 x 22"
Plug-in Cord
Discharge Hose
Pumps available for all plating solutions.

Complete In-the-tank Filter assembly

In-the-tank filter unit coated with filter aid and carbon being transferred from coating drum (at left) to plating tank.

- **Filters like magic**
- **Effective and dependable**
- **Simple and easy to use**
- **Adaptable to wide range of volume requirements and all plating solutions.**
- **Cuts costs — *TREMENDOUSLY***

How the New BELKE In-the-tank Filter works!

1. The Filter Unit, the part that does the clarifying, hangs on the tank, right in the solution.
2. The motor driven pump, rated at 300 gallons per hour, pulls solution through the filter and pours clarified solution back into the plating tank. Any number of units can be used to provide the required filtering capacity.
3. Filter Plate Assembly is $55.00—pump is extra depending on your choice. How can you get good filtering at less cost?
4. When a pre-coat of filter aid or carbon is required the pre-coat material may be mixed in any available drum. With the filter unit in the pre-coat mixture the pump draws the mixture through the filter and deposits the coat on the filter bag. When the desired amount of cake has formed on the filter bag, both filter and discharge hose are transferred to the plating tank without stopping the pump.
5. Filter bags of Dynel, Vinyon, Nylon or cotton twill can be furnished when specified. These bags require pre-coating as described above. To clean, they may be washed in another drum or set in a drum and the old cake flushed off with hose.

Saves major share of conventional filter costs. You buy only the filter unit — save the cost of filter tank, filter unit assembly, piping, etc.

Saves installation expense. You just hang the filter in the plating tank and plug in the motor.

Saves space. Only the pump and hose occupy space outside the plating tank.

Saves cleaning time. No time consuming tear down, reassembly and lockup of filter units.

Saves cost of slurry tank. Any available drum can be used for precoating.

Permits visual inspection of pre-coat. Just lift the filter unit out of the mixture and inspect the cake at any time.

Avoids Filter capacity problems. You don't need to worry about future requirements with BELKE In-the-tank filters. You can add more units or transfer unneeded filters to other tanks.

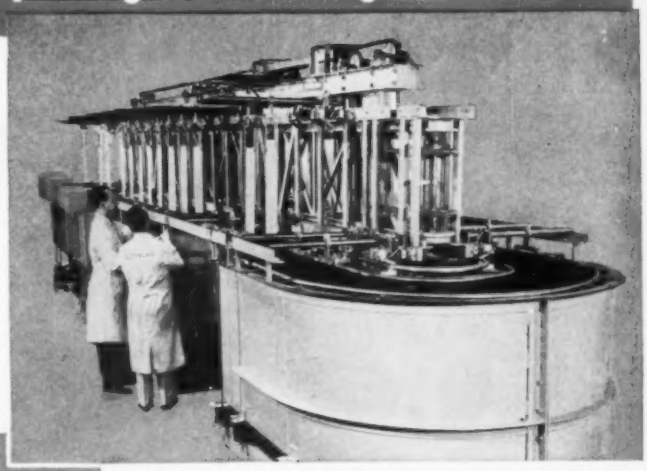
Built for long service. The Plexiglas filter plate is practically ageless under temperatures up to 180°F.

BELKE In-the-tank Filters can be furnished for practically all types of acid or alkaline plating solutions. *In ordering or requesting quotation please specify the type of solution to be filtered.*

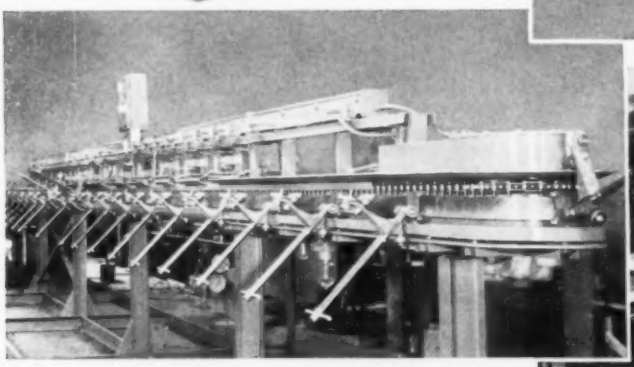
Belke MANUFACTURING COMPANY
947 N. Cicero Ave., Chicago 51, Ill.
EVERYTHING FOR PLATING PLANTS

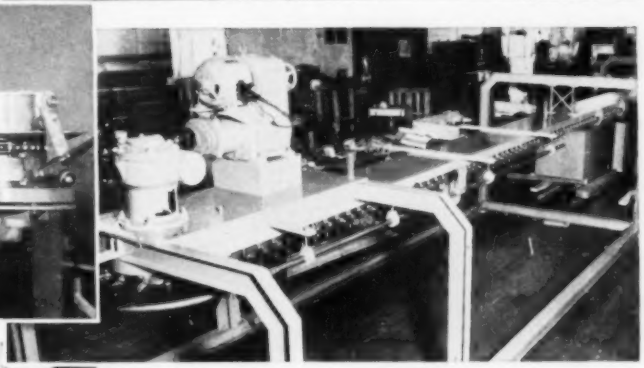
LASALCO has an automatic for any plating or anodizing operation!

CYCLEFLEX Full Automatic Plating & Anodizing Machine.
Most versatile of all automatics! No overhaul or rebuilding to switch cycles—just a simple moving in positions of pick-up heads and minor changes in tank partitions. Safety controls prevent conveyor breakdowns and load dropping. Many adaptations for any requirement. Low headroom.



SELECT-O-MATIC Multiple Process Plater.
Handles 2, 3 or more process cycles at one time! While loading, operator merely turns dial to select desired cycle for individual racks and the rest is fully automatic! One operator can handle several different processes simultaneously. Saves investment in a variety of machines—reduces floor space requirements—cuts maintenance to a minimum.





DAW JUNIOR CONVEYOR
Fully automatic handling of individual parts. Tailor-made for any production output and any cycle. Tank to tank work transfers raise carriers to above horizontal to prevent solution carry-over, and eliminate air or gas pockets in work. Automatic unloading if work permits.

DAW SENIOR CONVEYOR
Custom-engineered, fully automatic, for any job, any cycle, any production requirement. Transfers from one tank to another raises work from vertical to above horizontal to facilitate drainage, prevent solution dragout. Handles racks for all sizes and quantities of parts. Automatic unloading unless shape or work size is too large.

Write For Descriptive Literature

● Lasalco has the sound experience and proved ability to analyze your exact needs, and to give you equipment that will increase output do it better, faster, and far more profitably. Phone or write for the services of a Lasalco engineer.

LASALCO, INC.

HOME OFFICE: 2820 LaSalle St. • St. Louis 4, Mo. • PRospect 1-2990
IN TEXAS: 2805 Allen Street • Dallas, Texas • Riverside 7-5814

Here's an aluminum ...reduces maintenance costs... ...MIL-

Ordinary caustic solution causes build-up of scale on tank interior. Scale must be chipped off frequently.

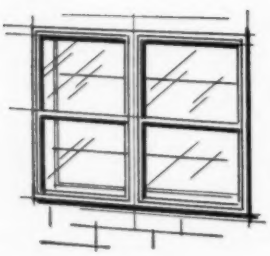
New Wyandotte Mil-Etch suspends dissolved aluminum in solution. No scale develops throughout entire life cycle.

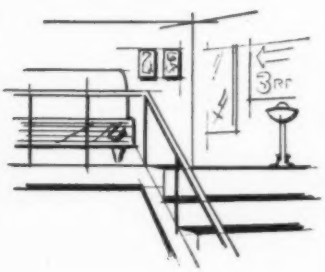
Here's a brand-new caustic-type aluminum etchant that eliminates expensive shutdowns, needless maintenance and labor costs. Mil-Etch keeps dissolved aluminum in solution—prevents it from forming a hard scale that must be chipped from tank walls.

Etches rapidly and uniformly. Economically concentrated, Wyandotte Mil-Etch produces an attractive, uniform, high-quality etch in only a few minutes on aluminum extrusions, wrought sheets and bar stock. You can also use Mil-Etch for deep etching or chemical milling of aluminum alloys.

Easy to use. Mil-Etch is nondusty, will not cake

Use Mil-Etch for





etchant that eliminates scale produces a bright matte surface

ETCH!

in drums; also, no excessive foam or fumes. You can use a tank of Mil-Etch until it becomes "loaded" with dissolved aluminum. Tank dumping is simple – just pull the plug!

Desmutting. For brightening aluminum alloys that turn dark in alkaline etching processes, try Wyandotte 2487. It is safer than ordinary acid solutions, and permits a closer control of the desmutting bath. Being in easy-to-handle granular form, solution make-up and additions are simple.

For full information on how new Mil-Etch and Wyandotte 2487 will solve your aluminum-etching problems, call your Wyandotte representative.

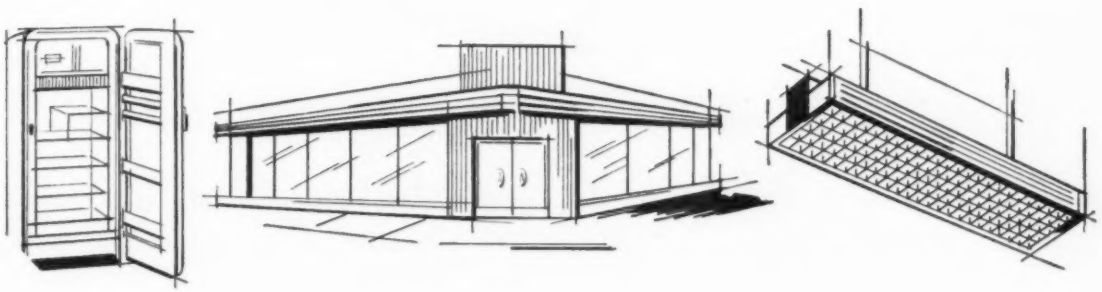
Wyandotte Chemicals Corporation, Wyandotte, Mich. Also Los Nietos, Calif. Offices in principal cities.

THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING

Wyandotte CHEMICALS

J. B. FORD DIVISION

etching all aluminum surfaces



remove RUST SCALE and SMUT FROM FERROUS METALS

with fast-acting AHCO Compounds

Whatever your removal problem, it will pay you to check Ahco's *complete* line of tested and proven compounds. Included are both acid and alkaline materials for soak tank, electrolytic tank, and tumbling operations. Three of the most popular are...

AHCO Deruster No. 11

A powerful, non-toxic alkaline compound, Ahco Deruster No. 11 will not attack ferrous base metal. It's ideal in electrolytic soak tanks.

AHCO Deruster No. 11-E

A non-ferrous alkaline compound for use in tumbling barrels, Ahco Deruster No. 11-E produces a clean bright surface.

AHCO Descaler A

A new, economical dry acid material, AHCO Descaler A is ideal for use in many acid dipping operations.

FREE bulletins describing these and many more AHCO Compounds are now available . . . write for your copies to

Hubbard Hall

APOTHECARIES HALL CO.

DIVISION OF

THE HUBBARD-HALL CHEMICAL CO.

WATERBURY, CONN.

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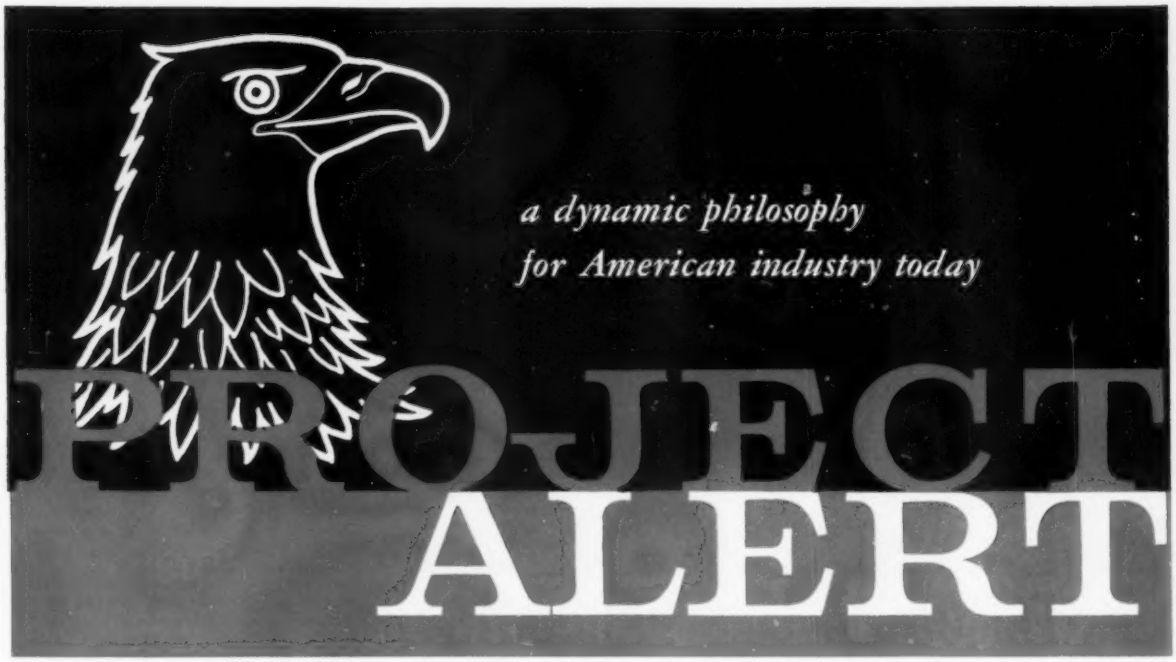


The purpose of this project is to establish a creative attitude of *dynamic alertness* on the part of all personnel in American industry.

Dynamic alertness is alertness on the move . . . is a positive, constructive way of thinking . . . a spirited new attack on your problems. It is swinging into action to get things done today . . . to insure a brighter, more prosperous future.

Three key words express the attitude of *dynamic alertness* . . .

1. **Observation:** This means inspiring your people to look at your problems with curiosity and creative imagination. It is taking a walk through your plant and looking at things as though you are looking at them for the first time. It is cutting through the fog of complacency and seeing things with new eyes. It is looking for new ways to stop leaks and losses; searching for new ways to speed production and efficiency.

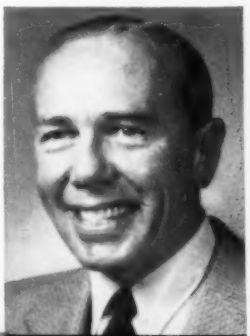
2. **Concentration:** This means the intense application of the mind power of everyone to specific problems. It is the starting of new creative fires in your organization. It is having key people ask themselves key questions: How can I do my job better? How can I speed the flow of work? How can I cut down on errors? It is applying individual and group thinking to a list of things to be done and sticking with them until they are finished. It is preparing today to solve the problems of tomorrow.

3. **Devotion:** This represents a new vital spirit of rededication to your company, to your customers, to your industry, to America. It is a return to the creative ingenuity that made this nation great . . . finding a way or making one. It is having the power and purpose to go forward, to believe in the future, to move ahead to better things.

We at Udylite believe in Project Alert. All of us, to a man, are pledged to a policy of dynamic alertness in every facet of our jobs . . . in our contacts with fellow workers . . . in the handling of equipment . . . on the production line . . . in our contacts with suppliers and customers.

C. H. Reeme, *president*
The Udylite Corporation

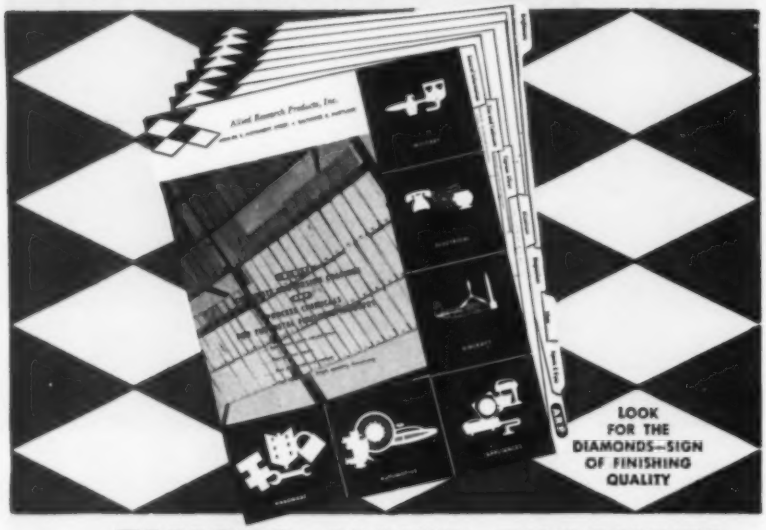
the udylite corporation
Detroit 11, Michigan
World's Largest Plating Supplier



Make Project Alert work for you

Apply this dynamic philosophy to your firm. New, fresh creative imagination, newer, better production methods, newer more reliable equipment applied to the job *now* . . . will pay off in a brighter, more prosperous tomorrow. Write for a free copy of the Project Alert folder and a free Project Alert lapel button. There's no obligation, of course.

Useful Technical Data File...



on FAMOUS ALLIED PRODUCTS

For Finishing, Cleaning and Protection of Metals

Here's a wealth of technical information gathered as a result of extensive product research, development and use throughout the world. This comprehensive file explains and describes all products, gives applicable metals, appearance of film, purpose of products, typical applications, U. S. Government specifications, method of application and test results.

IRIDITE® The finishing industry's most complete line of chromate conversion coatings. Give peak corrosion resistance, a lasting paint base and widest choice of appearance in decorative finishing on

ZINC AND CADMIUM ALUMINUM CUPROUS ALLOYS MAGNESIUM SILVER

ARP® BRIGHTENERS Liquid and powder materials for barrel, still or automatic ZINC and CADMIUM plating. High chemical stability provides maximum quality at minimum cost. Liquids available in AUTO-FLO-PAK for economical automatic dispensing.

ARP® PROCESS CHEMICALS

WETTING AGENTS DETERGENTS DYES FOR IRIDITE FILMS

ARP® CLEANERS and DEOXIDIZERS Specially formulated to provide maximum performance with IRIDITE coatings on aluminum and zinc die castings.

IRILAC™ New method of protection incorporating corrosion inhibitors in a water-soluble polymer base which dries to an extremely thin, tough, durable coating —clear in color. Does not chemically affect base metal or any post treatments. Used as a protective treatment alone or to enhance value of post treatments.

Write now for your copy of Allied's Technical Data File, or call your Allied Field Engineer for full information on Allied products. He's listed in your phone book under "Plating Supplies".

Your Finishing Problems Invited

Our Research and Development Department will be happy to work with you to develop a finish for your needs.

Allied Research Products, Inc.

4004-06 E. MONUMENT STREET

BALTIMORE 5, MARYLAND

***Manufacturers of* IRIDITE®, IRILAC™, ARP® Brighteners and Plating Chemicals — West Coast Licensee: L. H. Butcher Co.**

SAVE DESIGN TIME . . .

ASME'S handbook details best accepted methods of

- FORMING
- WORKING
- FINISHING

all engineering metals

PRACTICAL engineering facts to help you achieve

- *sound design*
- *production economy*

IN this handbook you will find detailed data on the various processes by which metals are converted into finished products, such as: heat treatment of steel, casting, hot and cold working, powder metallurgy, welding, machining, and electroforming. For each of the manufacturing methods there is a compilation of the basic physical characteristics to be considered, and the general advantages and limitations usually encountered. Concise, parallel data on suitability of various metals, and natural tolerances on size and surface conditions obtainable, assist in evolving designs that meet all functional requirements and economical production techniques.

ASME HANDBOOK

Metals Engineering Processes

Edited by ROGER W. BOLZ
Formerly Associate Editor,
Machine Design
Now Editor, *Automation*

Sponsored by the Metals Engineering Handbook Board of the American Society of Mechanical Engineers

423 pp., 7 x 10, 512 illus.
Nonmember $13.50, AES members $11.30

Illustrated with hundreds of tables, charts, and other helpful material, the book gives needed facts on scores of production processes. Not only are all the common, well-known fabrication methods covered, but you have information on many lesser-known techniques that many times prove to be the answer to tough production problems. Investment casting, stretch forming, powder metallurgy, flame machining and electroforming are a few examples of this latter case.

The depth of coverage makes easy the job of picking the most suitable process and adapting your design to that process.

All the processes of metal conversion are treated in detail. Thus, in a single, authoritative desk-top reference, you have the answers to scores of design problems.

PARTIAL CONTENTS

PART ONE: Heat Treatment of Steel
PART TWO: Casting
PART THREE: Hot Working
PART FOUR: Cold Working
PART FIVE: Powder Metallurgy
PART SIX: Welding and Cutting
PART SEVEN: Machining
PART EIGHT: Finishing
PART NINE: Electroforming

AMERICAN ELECTROPLATERS' SOCIETY
445 Broad Street, Newark, N. J.

"THIS STEVENS BARREL PLATING MACHINE IS SAVING EATON THOUSANDS OF DOLLARS...

...and it's completely automatic!" says R. J. Munsey

R. J. Munsey
Division Industrial Engineer
Reliance Division
Eaton Mfg. Co.
Massillon, Ohio

A Stevens Automatic Barrel Plating Machine, with *one* operator is cadmium plating 1,750 pounds of lockwashers, Springtites, and Keps an hour for Eaton. It has also . . .

- INCREASED PRODUCTION 270%
- REDUCED REJECTS TO LESS THAN 1%
- REDUCED REQUIRED FLOOR SPACE BY 400 SQ. FT.

These savings, both in supplies and labor, mean volume production for Eaton Manufacturing Co. They've discovered, as have an increasing number of progressive companies, that Stevens equipment assures maximum production and superior quality.

Lower costs, consistent quality and assured production are only a *few* of the reasons why Stevens Automatic Barrel Plating Machines are the leaders in their field. For more details, contact your local Stevens Sales Representative today! Find out why more and more metal finishers are looking to Stevens for production savings.

Remember—When you go Automatic . . . go Stevens!

frederic b. **STEVENS,** inc.

DETROIT 16, MICH.

BUFFALO CHICAGO DETROIT CLEVELAND
DAYTON NEW HAVEN SPRINGFIELD (OHIO)

DU PONT REG. U. S. PAT. OFF. *PRODUCT NEWS*

PLATING SPECIALIST AT NEW LABORATORY (above) studies copper anode corrosion in transparent plating tank. Du Pont specialists are constantly searching for new ways to improve copper-plating techniques. (Left) New $2 million laboratory houses the latest plant-scale equipment to help insure practical solutions to production problems.

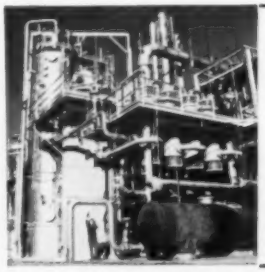
New Du Pont Laboratory helps solve customer problems ...researches new copper-plating processes

Plating problems are a major consideration at Du Pont's new Sales Technical Laboratory. Here, trained specialists use full-scale plating equipment to work out practical answers that can help you improve copper-plating quality, speed production, cut costs.

Research in plating techniques and processes is another important activity at the new lab. This continuing Du Pont research has resulted in a new high-speed cyanide process for bright-copper plating on steel parts and zinc die castings. This new process has been thoroughly field-tested, and is producing high-quality results on such parts as automobile bumpers and grilles, hardware products and wire.

Another Du Pont development now undergoing tests and refinements is a new technique for plating level copper on polished-steel parts. This new process promises to eliminate unracking, buffing and cleaning prior to nickel and chromium plating on many different types of parts. The level-copper process holds considerable promise for the plating of zinc-base die castings for smoother, more uniform deposits with excellent hiding power.

Ask your Du Pont Technical Representative for more details about these new plating developments resulting from Du Pont research, or about any of the products on the opposite page.

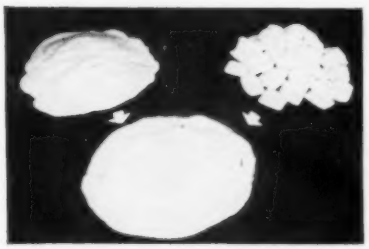


MODERN PLANT ASSURES DEPENDABLE SUPPLY OF QUALITY PLATING CHEMICALS

Du Pont plant at Memphis, Tenn., is now producing highest-purity sodium cyanide and potassium cyanide to meet your plating requirements. Example: Du Pont potassium cyanide is 98% minimum pure with .0003% maximum sulfides (as sulfur). You can order mixed shipments . . . save time, money, storage space.

FOR BETTER COPPER PLATING

Du Pont research results in Copper-Plating Chemicals that help you speed production, improve quality



Pre-mixed for your convenience —unique Du Pont double salt

This new salt developed by Du Pont combines high-purity Du Pont Cyanobrik® sodium cyanide and copper cyanide into *one* convenient copper-plating chemical for both bath make-up and replenishment. It saves time, cuts down handling of chemicals for greater safety, reduces errors because ingredients are already in the proper proportions required by bath.

SPECIFICATIONS

Copper	28.7% min.
"Free" sodium cyanide	0.4% to 2.0%
Lead	7 ppm. max.
Sulfides as sulfur	10 ppm. max.
Insolubles	0.01% max.

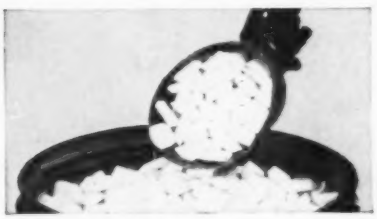
TYPICAL ANALYSIS

Copper	29%
"Free" sodium cyanide	1%
Lead	Less than 1 ppm.
Sulfides as sulfur	Less than 5 ppm.
Insolubles	0.01%

Du Pont Copper Cyanide— regular plating tests insure quality

With Du Pont Copper Cyanide your benefit is in low unit costs that result from savings in time, labor and overhead charges. For example, Du Pont Copper Cyanide readily dissolves in cyanide solutions without introducing inert salts into the plating bath. In addition, you get faster plating with high current density and rapid metal deposition.

Du Pont guarantees a copper content of 70.0% min. and a cyanogen content of 28.5% min. As a further guarantee of the quality of Du Pont Copper Cyanide, regular plating tests are conducted by Du Pont to insure maximum performance.



Du Pont Cyanobrik® now guaranteed 97% min. sodium cyanide

New high-purity "Cyanobrik" sodium cyanide specifications guarantee a higher minimum cyanide content, which can result in a lower net cost for your active cyanide. Automatically, maximum permissible impurities are lowered. This means that you get a full extra pound of active cyanide per 100 lbs. of "Cyanobrik."

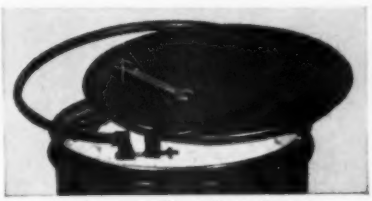
You can count on the uniform high quality of "Cyanobrik" for even the most critical plating jobs. The negligible sulfide content makes Du Pont "Cyanobrik" particularly suitable for use in sulfide-sensitive electrolytes, such as proprietary bright-copper baths.

SPECIFICATIONS

Sodium cyanide	97% min.
Sodium chloride	0.2% max.
Sulfides (as sulfur)	0.0005% max.

TYPICAL ANALYSIS

Sodium cyanide	97.5%
Sodium hydroxide	0.4%
Sodium carbonate	1.5%
Sodium formate	0.35%
Sodium chloride	0.1%
Water	0.15%
Sulfides (as sulfur)	0.0004% (4 ppm.)



Drum head comes off quickly with a few turns of a wrench.

Easy-opening, reclosable drums simplify handling of "Cyanobrik" sodium cyanide

Both 100- and 200-lb. net steel drums for "Cyanobrik" sodium cyanide are nonreturnable open-head steel drums. A few turns of a wrench open the drum. It closes just as easily, giving full protection to partially used contents during storage.

FOR MORE INFORMATION about any or all of Du Pont's full line of high-quality products for copper plating, just give your Du Pont distributor a call, or write your nearest Du Pont District Office listed below.

DISTRICT AND SALES OFFICES:

Baltimore 2	321 Fallsway
Boston 10	140 Federal St.
Charlotte 1	427 W. Fourth St.
Chicago 46	7250 N. Cicero Ave., Lincolnwood
Cincinnati 2	2412 Carew Tower
Cleveland 20	11900 Shaker Blvd.
Detroit 35,	13000 W. Seven Mile Rd.
Kansas City 20*	Guinotte & Mich. Av.
Los Angeles Box 70,	El Monte, Calif.
New York 1	350 Fifth Ave.
Philadelphia	308 E. Lancaster Ave., Wynnewood
San Francisco 4	111 Sutter St.

Export Division, Du Pont Building Wilmington 98, Del.

*Barada & Page, Inc.

ELECTROCHEMICALS DEPARTMENT
SODIUM PRODUCTS DIVISION
E. I. DU PONT DE NEMOURS & CO. (INC.)
WILMINGTON 98, DELAWARE

DU PONT

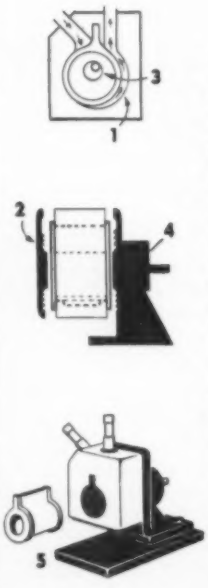
REG. U.S. PAT. OFF.

Better Things for Better Living...*through Chemistry*

NEW!

VANTON'S NEW TEFLON* PUMP!

HOW VANTON DESIGN WORKS



Liquid flows in channel between molded plastic body and synthetic flex-i-liner (1) • No liquid touches metal • Liner flanges secured to plastic body by bolted face plates (2) • Pumping mechanism is rotor mounted on eccentric shaft (3) • At each revolution it pushes liner against body block and sweeps a slug of liquid around the circular track from inlet to outlet • All bearings are outside of fluid area, and located within a protective stainless steel assembly in the event of flex-i-liner failure (4) • Liners are replaced in minutes, with pump in process line, by simply removing face bolts and face plate, slipping old liner out, new one in (5).

No stuffing-box or shaft seals to leak, contaminate, or require maintenance!

Long-term maintenance-free operation even with aqua regia!

Now at last, here's a pump to solve for good your problems of pumping corrosive or abrasive liquids or slurries! HCl, caustics, $TiCl_4$, even fuming HNO_3 and fuming H_2SO_4 (oleum), all yield to the combination of Vanton's unique pump design with *Teflon and Kel-F** elastomer*, the outstanding new fluorocarbons that remain unaffected by even aqua regia!

The Vanton Pump design eliminates stuffing boxes, shaft seals, gaskets, and check valves. Previously available in many other plastics and synthetics, its appearance now in fluorocarbon materials enables it to provide prolonged maintenance-free pumping of almost any corrosive or abrasive substance in commercial production today.

All Vanton pumps are self-priming, high-vacuum, and available in a broad range of capacities from ⅓ to 40 g.p.m. In addition to Teflon, they are obtainable in 7 body and 10 flex-i-liner materials, including polyethylene, Buna N, hypalon, Kel-F, etc.

**TEFLON—Reg. trade-mark of Du Pont for its tetrafluoroethylene resin.*
***KEL-F—Reg. trade-mark of Minnesota Mining & Mfg. Co.*

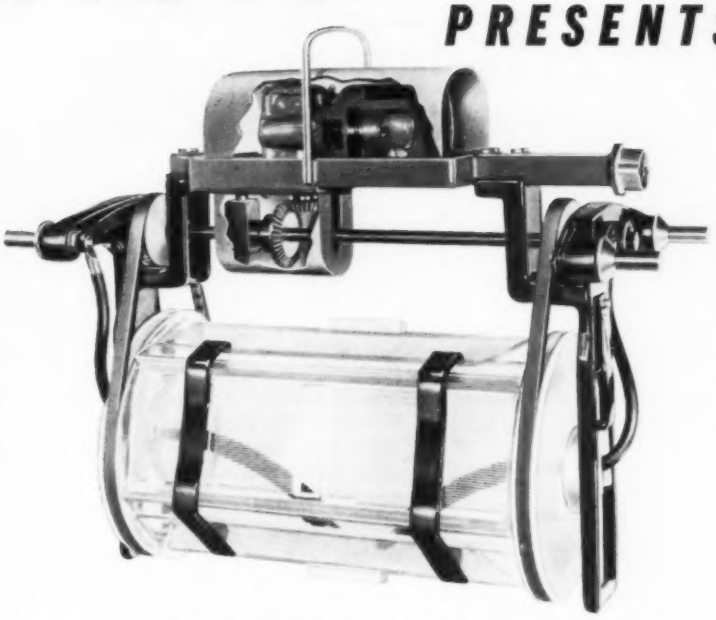
WRITE FOR NEW 8-PAGE VANTON CATALOG TODAY!
It gives the whole story!

VANTON PUMP and Equipment Corp. • Hillside, N. J.
DIVISION OF COOPER ALLOY CORP.

INDICATE A 1024. ➤

STUTZ—

PRESENTS A NEW DESIGN



in PLATING BARRELS—

Featuring

Motor drive integrally mounted

Complete cycle

Continuous rotation from one operation to the next

Cog belt cylinder drive

Positive grip one piece outboard mounted cog pulleys

The motor-combined unit shown affords special economy since drives on tanks are not required, and rotation of the cylinder can be continued from one operation to the next. Solution dragout is therefore reduced to a minimum. This design is ideal for application on the carriers of a full automatic conveyorized plating machine. Hanger arms completely covered with fused plastisol.

The motor drive to the countershaft is through bevel gears operating in a gear case and permanently lubricated. Standard R.P.M. of the cylinder is 5; however, other speeds are obtainable at no extra cost.

The initial cost of belt driven units is substantially lower than gear driven barrels, and maintenance virtually eliminated.

The Stutz Co. has advanced plating barrel design and construction so that today these units are highly productive and maintenance reduced to a minimum. Costly replacement parts such as cylinder gears and bearings are eliminated completely. The only expendable parts are the belts. To provide long belt service, a special non-stretch cog belt with internal steel reinforcement is used. Belts can be changed, if necessary, in seconds at the tank without tools. The Stutz hanger extends below the cylinder thereby adding protection to the cylinder and also permitting the assembly to be lowered to the floor. The Stutz assembly incorporates a lock-in design that permits removal of the cylinder instantly from the hangers without the use of tools. This means cylinders with special perforations or partitions can be installed or removed quickly.

ALSO ADAPTABLE FOR TANKS OTHER THAN OURS

STUTZ PORTABLE PLATING BARRELS

The Stutz Portable Barrel is made in 3 standard sizes with cylinders having inside dimensions of 6″x12″, 8″x18″ and 10″x18″ I.D. Smaller upon application. Standard openings are 3/32″. Smaller or larger openings can be furnished as required.

★*Baskets in perforated metals or wire mesh.*

★*Load/Unload Stand for convenient and fast handling of work load.*

Write for Catalog and Prices *We Invite Your Inquiries*

THE STUTZ COMPANY
4420 West Carroll Ave., Chicago 24, Illinois

Complete Metal Finishing Equipment and Supplies

TRADE LITERATURE

L—1000. Polishing and Buffing Machine—A new 16-page, two-color illustrated catalog describing the straight line type of automatic polishing and buffing machine has been published by Acme Manufacturing Co.

Included in the introductory section of the catalog is a discussion of the basic factors to consider when selecting one of seven types of straight-line machines developed to suit a wide variety of part requirements in low, medium and high production ranges.

The seven types of straight-line machines are described in individual sections where detailed information is given including design features, operating descriptions, typical applications and machine illustrations.

Types of machines treated in the comprehensive work include reciprocating, fixture-return, horizontal-return, over-and-under, rectangular, universal and rotary-conveyor.

1.7 / 3.0 microns

THERMARED

IMMERSION HEATERS

Featuring

VAPO-VENT

VAPOR and LIQUID TIGHT VENTING ASSEMBLY ON ALL METAL HEATERS

and

NEO-TITE

VAPOR and LIQUID TIGHT ASSEMBLY ON ALL QUARTZ HEATERS

THERMARED, an improved line of immersion heaters, presented by **N.J. THERMEX**, introduces a new innovation of vapor venting to eliminate internal explosion in Quartz heaters. The **VAPO-VENT** assembly provides a venting system for expanding gases, a completely liquid sealed head assembly and an extremely versatile unit which permits field repair with standard replacement. These exclusive **THERMARED** features are further aided by the **NEO-TITE** vapor and liquid tight assembly which protects the heating elements in both Quartz and Steel units. Here at last, is a thoroughly versatile unit permitting even accidental total immersion in highly corrosive chemicals with no harm to the equipment.

These and many more features are fully detailed in our latest catalog available on request. Models in standard, thermostatic and remote control thermostatic units are available in Steel, Stainless Steel and Quartz construction.

*ON QUARTZ HEATERS

N. J. THERMEX COMPANY, INC.

535 - 533 BERGEN ST., HARRISON, N. J.

L—1001. Phosphating Material—Development of a new phosphating material that provides a tight bond for paint, other organic finishes and metal drawing has been announced by Turco Products, Inc. Called Turcoat 4333, the new material deposits a zinc phosphate coating on iron, steel, zinc and cadmium of up to 400 miligrams/sq ft.

It meets USA-57-O-2C, Type II, Class C and MIL-S-5002. It may be applied by either spray washer or immersion. Detailed technical literature on Turcoat 4333 may be obtained.

L—1002. Surface Active Agents—Geigy Industrial Chemicals Division of Geigy Chemical Corp is offering a new technical bulletin on Sarkosyl surface active agents. This fifteen-page pamphlet describes typical applications of the products. Applications in the metal finishing and processing fields are reported to include use as an addition to gold plating solutions, as an aid in wetting out ferrous and non-ferrous metals when added to solvent degreasers, and as a corrosion preventative when introduced into the rinse tank.

L—1003. Paint Film Gauge—A four-page booklet has been issued by Koehler Instrument Company, Inc. detailing features of their paint film gauge and the Pfund Cryptometer. The latter is described as an instrument for measuring the true hiding power of a paint within three to five minutes, covering both the thickness of the paint at its most efficient hiding power and the coverage per gallon at this thickness.

A diagram of the paint film gauge is included together with the results of certain experiments made to test the accuracy of the instrument.

L—1004. Heaters and Devices—A new heaters and devices catalog available from General Electric supplies answers for hundreds of heating problems and helps expedite product delivery by clarifying ordering information. The 52-page booklet is designated GEC-10051.

New product information is included on pipe heaters, thermostatically controlled immersion heaters, 1-inch diameter water

mmersion heaters, domestic water heater replacement elements, new ratings and configurations of tubular heaters and many others.

Various heating processes are described in a 10-page power requirements section. Typical application problems are solved to give heating requirements in a short-form method. The short-form calculations give adequate accuracy for ordinary requirements.

The streamlined publication includes up-to-date data, specifications, operating information and manufacturer's recommended list prices of standard heaters and heating devices. Included are immersion, strip, cartridge, tubular, finned tubular and railroad switch heaters. Unit heaters, soldering irons, soft metal melting pots, oven equipment and controls are also described.

L—1005. Phosphate and Chromate Processes—An iron-zinc phosphate process for rust proofing steel, zinc base diecastings, zinc and cadmium plate is fully described in technical data sheet No. 27, a four-page usage and instruction sheet prepared by MacDermid Inc. Called Phosphotex, the process promotes the adhesion and durability of paint finishes, provides a mechanical bond for paint, protection against rust around dents, nicks and accidental scratches.

A new group of compounds for producing chromate conversion coatings on zinc and cadmium plated work, on zinc diecastings, and on aluminum is described in MacDermid's four-page technical data sheet No. 76. Called Maccromates, the new line includes the following types of coatings: single dip clear, leach type clear, iridescent yellows and bronzes, olive drab, chemical polishes for zinc diecastings, clear to bronze on aluminum.

L—1006. Metal Degreasing—The more modern methods of degreasing metal surfaces are examined in one of a series of bulletins published for the trade by the Department of Industrial Research of L. Sonneborn Sons, Inc.

The modern methods, says the bulletin, utilize emulsion cleaners which eliminate the fire hazards of older methods and are much more effective in removing dirt and soil. The emulsion cleaners are broken down into these three types: stable emulsion type cleaners, two-phase, or diphase, emulsion type cleaners and soak-type emulsifiable cleaners. The bulletin then discusses the principles on which each type is based and how they should be used.

L—1007. Anodizing Aluminum—The Metal Finishing Division of Frederic B. Stevens, Inc., has just produced an authoritative study of the use of automatic equipment in anodizing aluminum.

Authored by Guy Cummings, manager of plating and equipment sales, this paper contains a detailed analysis of anodizing conditions, film qualities, racking, handling current surges, tank design, temperature control, cleaning, bright dipping, coloring and sealing.

L—1008. Filtration—"A New Concept of Electroplating Filtration" is the title of a new booklet available from Commercial Filters Corp. The booklet explains how Fulflo filters, with honeycomb filter tubes, provides tank turnover up to 3 times per hour. This allows complete solution filtration up to four times in an eight-hour day to help assure a firm hard plate. Filters for electroplating, water and compressed air are illustrated and described. A new stainless steel filter is also highlighted.

L—1009. Industrial Valves—The Ohio Injector Co. has published a new condensed version of its general catalog which lists its complete line of industrial valves.

Now available for distribution, this catalog lists over 95 per cent of the line, condensed into 28-page form. Valve figure numbers are indexed for finger-tip reference by topics; face to face dimensions are supplied in full size ranges.

The condensed version lists for the first time a section on bronze brazed joint valves as well as its corrosion resistant nickel-iron line. A forged and cast steel section has been developed showing complete valve trim designations and pressure temperature charts with ratings to latest ASA specs.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1026.

How your truth dollars help keep the Reds in the red

• The truth dollars you give to Radio Free Europe help keep truth on the air behind the Iron Curtain.

And the truth is an enormously disruptive force to the Reds. For it keeps their captive people thinking . . . wondering . . . and less than completely dominated. The truth keeps needling the Reds. Breaks through their monopoly of lies. Keeps them unsure. Off balance. And thus the truth keeps up to forty fully armed Red divisions tied up policing Russia's satellite countries. Forty divisions, mind you, that might otherwise be put to more aggressive use elsewhere . . . and who knows where?

Your truth dollars keep the 29 super-powered transmitters of the Radio Free Europe network on the air . . . broadcasting the truth behind the Iron Curtain . . . every hour of every day.

Why *your* truth dollars?

Because Radio Free Europe is a private, non-profit organization supported by the voluntary contributions of American business and the American people. And *your* dollars are urgently needed to keep it on the air . . . to help operate its transmitters, pay for its equipment and supplies, and its scores of announcers and news analysts in 5 languages.

Help keep the Reds in the red. Send your truth dollars to Crusade for Freedom, care of your local postmaster.

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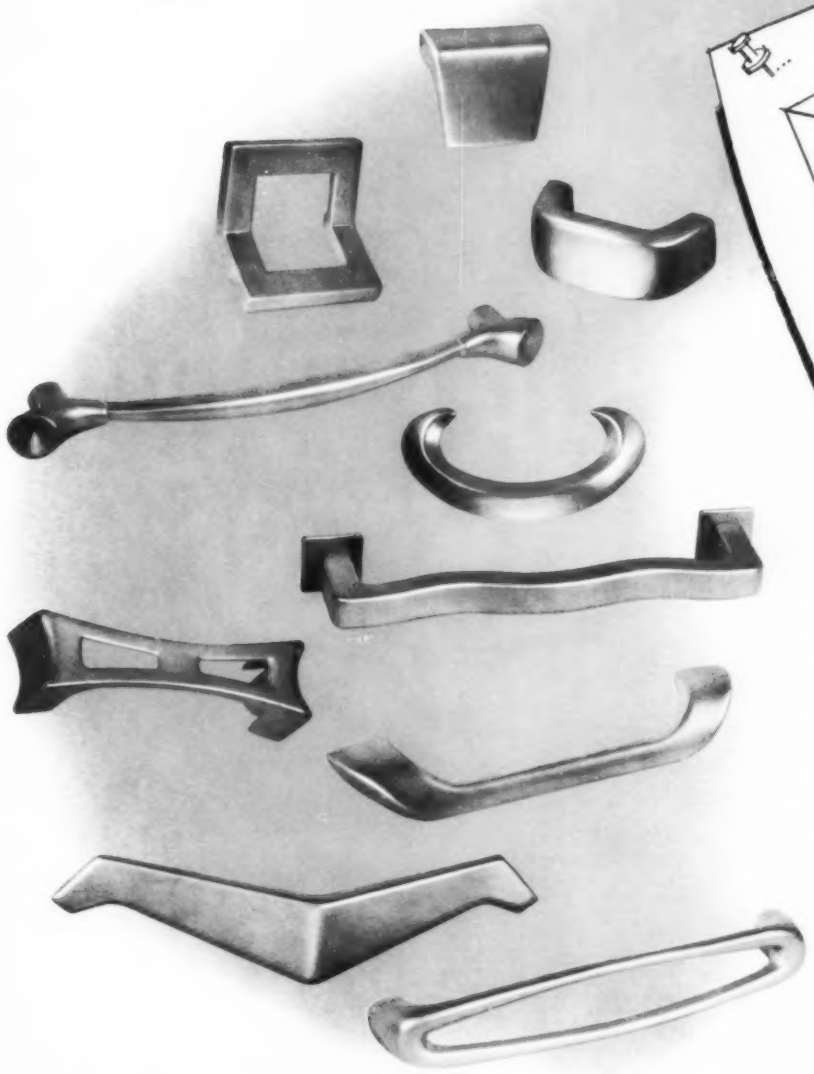
Satin ELEGANCE in Modern Furniture Hardware

by *Bassick-Sack*



BASSICK-SACK, a division of Stewart-Warner Corporation, is one of the country's largest manufacturers of fine furniture hardware . . . and much of this hardware is Lea Satin Finished.

Bassick-Sack says, "In the finishing of all of these parts we use various Lea Compounds, particularly in our buffing and polishing processes, and we are pleased to state that these compounds afford us the fine lustre and quality finishes that are demanded by our customers and the consuming public."

So, for your consumer products, why not try a LEA Satin Finish. Here is a modern finish, a quality finish, a durable finish, a low cost finish . . . a finish that both sales and manufacturing will go for. Write us today for further information on LEA SATIN FINISH.

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learek . . . Industry's quality buffing and polishing compounds for over 30 years.

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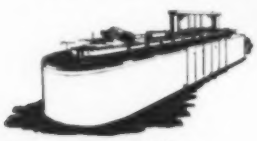
Lea Mfg. Company of Canada, Ltd., 1236 Birchmount Road, Scarborough, Ontario, Canada
Lea Mfg. Company of England, Ltd., Buxton, England
Lea-Ronal, Inc., Main Office and Laboratory: 139-20 109th Ave., Jamaica 35, N. Y.
Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

Are you interested in plating specialties? See the other side of this insert

Something New and Better

for you to investigate

NICKEL-GLEAM N222*



Users are getting EXCEPTIONAL LEVELLING without sacrificing Throwing Power · Ductility · Chromium Receptivity

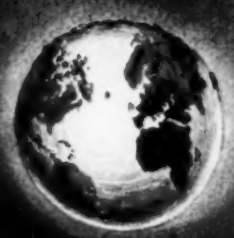
Because of its versatility, N222 can be used effectively with either mechanical or air agitation . . . in fact, without agitation should none be available. And all this plus high tolerance to organic and metallic contamination! You can switch over to NICKEL-GLEAM N222 without changing conditions under which you prefer to operate. You will get better results. A trial run will prove it.

NICKEL-GLEAM N222 is a product of Lea-Ronal Research Laboratory widely experienced in plating procedures and responsible for some of the most productive formulations being used today.

Lea-Ronal *Inc.*

Sales and Manufacturing Plant:
237 East Aurora Street, Waterbury 20, Conn.
Main office and Laboratory:
139-20 109th Avenue, Jamaica 35, N. Y.

*Patented



Are you interested in Buffing, Polishing and Burring Specialties? SEE THE OTHER SIDE OF THIS INSERT.

◀ INDICATE # 1002.

KNOWLEDGE OF INESTIMABLE VALUE IN THESE AES RESEARCH PROJECT REPORTS CURRENTLY AVAILABLE

Cleaning and Preparation of Metals for Electroplating, IV, V, VI & VII—By H. B. Linford & E. B. Saubestre — *Serial 26, Project 12* — **$3.50**

Methods for Testing Thickness of Electrodeposits, II & III—By H. J. Read & F. R. Lorenz — *Serial 27, Project 7* — **$1.35**

Porosity of Electrodeposited Metals—By N. Thon, D. G. Kelemen, L. Yang, S. Yang, D. Dean — *Serial 28, Project 6* — **85 Cents**

The Analysis of Electroplating Solutions for Major Constituents—By E. J. Serfass & M. H. Perry — *Serial 29, Project 2* — **90 Cents**

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Effect of Surface Finishing of Nonferrous Base Metals on Protective Value of Plated Coatings—By G. J. Kahan, W. W. Macchia, J. M. Fairbank — *Serial 31, Project 4* — **45 Cents**

How the Small Electroplater Can Treat Cyanide Plating Waste Solutions with Hypochlorites—By Barnett F. Dodge and Walter Zabban, Yale University, New Haven, Connecticut — *Serial 33, Project 10* — **50 Cents**

Effects of Impurities and Purification of Electroplating Solutions, IX, X & XI—By Dr. D. T. Ewing, Dr. A. J. Smith & Dr. W. O. Dow — *Serial 34, Project 5* — **50 Cents**

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IMPROVED ELECTROPLATED FINISHES FOR ZINC DIE CASTINGS

by W. H. SAFRANEK and C. L. FAUST†

INTRODUCTION

THIS PAPER PRESENTS an account of progress on two phases of the research being conducted at Battelle Memorial Institute for the American Zinc Institute. These phases are:

(1) Study of electropolishing and electroplating procedures for reducing costs of finishing die castings.
(2) Study of plating procedures for improving the corrosion resistance of electroplated die castings.

SMOOTHING BY ELECTROPOLISHING TO PREPARE FOR PLATING

From information furnished by the American Zinc Institute, it appeared that the costs for polishing and buffing zinc die castings, prior to plating them, corresponded to between 20 and 30 per cent of the total manufacturing costs, including casting, trimming and plating, or nearly 50 per cent of the finishing costs, including plating but excluding casting and trimming. Therefore, it appeared appropriate to investigate methods for eliminating polishing or buffing. Towards this end, research was started on procedures for electropolishing or chemical polishing zinc die castings and plating them with leveling electroplates.

Among several procedures introduced commercially or reported in the literature for chemically polishing or electropolishing zinc die castings, a proprietary electropolishing procedure employing an alkaline solution* appeared to be best. Its advantages were as follows:

(1) Die cast surfaces could be brightened slightly more by the alkaline bath, by comparison with other processes. When conditions were properly adjusted, surfaces were uniform in appearance.
(2) Unlike the other baths, the alkaline bath could be used simultaneously for cleaning and electropolishing after the parts were degreased with a solvent. Furthermore, no special activation was required after electropolishing and rinsing prior to electroplating.
(3) From information available on bath makeup and maintenance, it appeared that the alkaline bath could be operated at a lower cost, by comparison with other procedures.

Conditions for operating the alkaline bath normally were as follows:

Total salt concentration	100 oz/gal
Specific gravity	1.55
Temperature	75 to 90 F
Voltage	8 to 10 v
Anode current density	200 amp/sq ft
Anode efficiency	45 to 50 per cent
Cathodes	Steel (hot rolled)
Electropolishing period	2 to 4 min
Electropolishing rate	0.0004 in./min

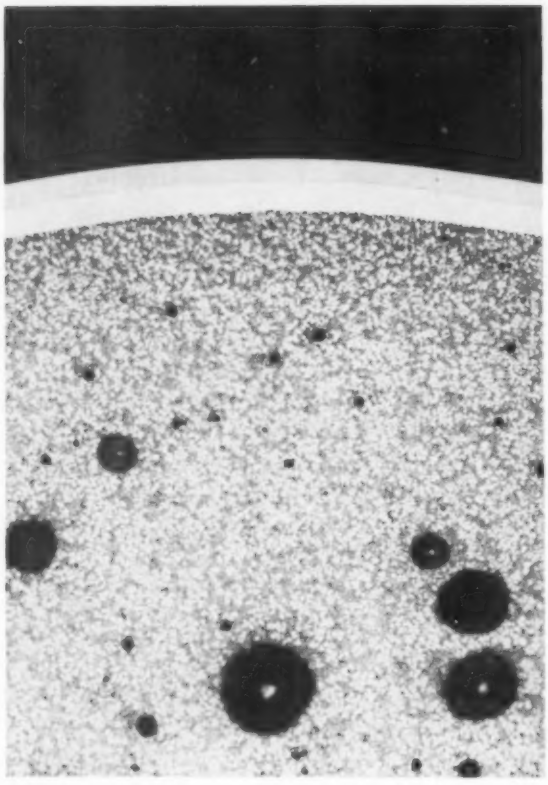
The zinc concentration of a 12-gallon electropolishing solution changed only very slightly during an operating period of more than 38 ampere hours/gallon; zinc that was dissolved from the anodes precipitated as a sludge and settled at the bottom of the tank. Salts consumed by dragout which corresponded to only about 3 oz/10 sq ft were replenished by making regular additions. During the 450 amp hour period of operating the bath, about 70 sq ft were electropolished in a 12-gallon tank.

The nonporous "skin" layer of a die cast automotive door handle was approximately 0.002 in. thick, judging by metallographic examination of cross sections. Such a cross section is shown in Fig. 1. For such die castings, more than 4 minutes of electropolishing resulted in surface pitting because pores in the die casting became exposed.

For some die castings with a complex shape, and having a thinner skin layer, the electropolishing period could be extended to no longer than 2 minutes without exposing an excessive number of pores. In a few cases, even 2 minutes of electropolishing at 200 amp/sq ft revealed a few pores. But, in general, 2 minutes usually gave satisfactory results.

Die castings that were mechanically polished at defective areas to remove cold shut or other casting defects were smoothened markedly by electropolishing. Quantitative data on smoothing power were obtained by polishing flat die cast panels with fine and coarse polishing grits at different areas and measuring the surface roughness before and after electropolishing the panels. Fig. 2 shows a representative panel with four polished bands before the panel was electropolished and another such panel after electropolishing.

† Battelle Memorial Institute, Columbus, Ohio.
* "Delozin" Process, Diamond Alkali Company, Painesville, Ohio.



Picral Etch 100 X

Fig. 1. Cross section of unbuffed, electroplated die casting showing pores beneath the "skin." The thickness of the "skin" is about 0.002 inch.

Surface roughness data, summarized in Table I, indicated that electropolishing for 4 minutes at 200 amp/sq ft smoothened polished zinc die cast surfaces approximately 25 per cent. A 2-minute period would result in less smoothening, but quantitative data are not available.

Despite the good smoothing characteristics of the electropolishing procedure, neither polished nor unpolished die castings were fully bright in appearance after they were electropolished and plated conventionally (but without buffing). After plating the die castings with 0.0003 inch of copper and 0.0005 or 0.0008 inch of bright nickel, polishing scratches at strapped areas and scratches due to normal bulk handling were still visible. Thus, a need arose to identify as electroplating procedure with good leveling characteristics for augmenting the smoothing power of the electropolishing procedure.

LEVELING BY ELECTROPLATING

Although it appeared that electropolished and plated die castings could be improved in appearance by adopting a leveling bright nickel, an evaluation of this procedure indicated that the thickness of the nickel would have to be increased considerably over that generally specified for zinc die castings. Thus, the cost of increasing the thickness of the nickel plate would offset the saving introduced by substituting electropolishing for buffing. Therefore, attention was turned to leveling copper and zinc plates because copper and zinc are less costly than nickel.

A proprietary process for electroplating bright copper resulted in enough leveling to produce a smooth, mirrorlike appearance on representative electropolished, copper plated and bright nickel-plated die castings, providing the copper and the nickel were at least 0.001 and 0.0008-inch thick, respectively. However, a study of this procedure revealed two drawbacks as follows:

(1) Pores that were occasionally exposed by 2 minutes of

TABLE I

SMOOTHING POWER OF ALKALINE ELECTROPOLISHING PROCESS FOR ZINC DIE CASTINGS

Electropolishing Conditions		Surface Roughness Measurements[a], rms microinches		
Cathode Current density, amp/sq ft	Time, minutes	Before Electropolishing	After Electropolishing	Per cent Smoothing
400	4	11.5	5.9	48
400	4	16.5	9.3	45
400	4	19.5	11.3	42
400	4	27.0	14.4	47
400	4	34.0	19.5	43
200	4	4.9	3.9	20
200	4	7.5	6.0	20
200	4	14.0	10.3	26
200	4	24.0	19.0	21
200	4	32.5	23.7	27
200	4	40	28	30

(a) Averages of 5 measurements with a Profilometer at each location.

TABLE II

EFFECT OF INCREASING THE CATHODE CURRENT DENSITY ON APPEARANCE OF LEVELING ZINC PLATE ON UNBUFFED ZINC DIE CAST DOOR HANDLES[a]

Cathode Current Density amp/sq ft[b]	Voltage, volts	Plating Time min[c]	Rate of Deposition mils/hr	Appearance of Zinc Plate	
				Before plating with Copper, Nickel, Chromium	After plating with Copper, Nickel, Chromium
150	3.4	50	2.4	Very slightly grainy in recesses; nonuniformly semibright	Superior leveling; very slightly hazy at low current density areas
200	4.4	40	3.2	Uniformly semibright except for slightly dull recesses	Superior leveling; mirror bright
250	5.4	31	3.85	Uniformly semibright	Superior leveling; mirror bright
300	6.4	25	4.8	Bright, but semibright in recesses	Superior leveling; mirror bright

(a) The zinc bath composition was as follows:

$ZnSO_4 \cdot 7H_2O$	450 g/l
NH_4Cl	15 g/l
H_3BO_3	15 g/l
Sodium Citrate	25 g/l
Citric acid	25 g/l
Na_2SO_4	15 g/l
Glycerin	7 g/l
Sacharin	18 g/l
p-Toluene sulfonamide	2.7 g/l
Tergitol, by volume	0.5 per cent
pH	2.4 ± 0.05

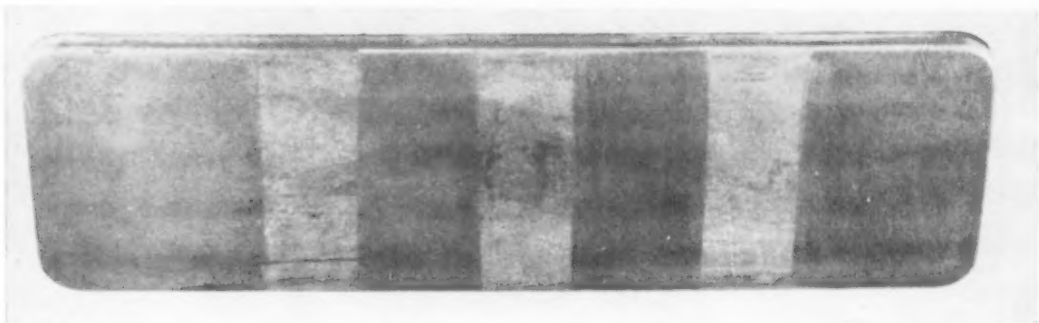
Operating conditions:
PR cycle
Direct for 15 seconds
Reverse for 9 seconds

Agitation: Air plus work bar

Temperature: 115 to 118F

Anodes: Special high grade zinc slabs bagged in nylon.

(b) The current density during the reverse part of the cycle was about 5 per cent higher than the current density during the direct part of the cycle.
(c) The calculated average thickness of all the zinc plates was 0.0020 or 0.0021 inch.



RMS Microinch Readings 6.0 11.5 21.5 27.0

Before Electropolishing

RMS Microinch Readings 4.9 5.9 13.5 14.5

After Electropolishing

Fig. 2. Image reflections from die-cast panels with two bands of fine polishing scratches on the left and two bands of rough polishing scratches on the right.

TABLE III

SURFACE ROUGHNESS MEASUREMENTS ON FLAT DIE CAST PANELS ELECTROPLATED WITH LEVELING ZINC,[a] COPPER, BRIGHT NICKEL AND CONVENTIONAL CHROMIUM

Band[b]	Zinc Plating Current Density amp/sq ft	Profilometer Readings, rms microinches[c] Before Electropolishing	After Electropolishing[d]	After Plating[e]	Total leveling, per cent
A	200	4.4	4.3	1.5	66
B	200	16.5	9.3	2.3	86
C	200	19.5	11.3	3.2	84
D	200	34.0	19.5	5.5	84
A	200	4.5	Electropolished 15 seconds	1.7	62
B	200	13.6	Ditto	4.4	68
C	200	19.7	"	6.7	66
D	200	28.5	"	12.0	58
A	300	4.9	3.9	1.2	76
B	300	15.9	11.7	3.3	79
C	300	20.2	15.3	5.2	75
D	300	32.5	23.7	8.5	74
A	200	4.4	5.3	1.1	75
B	200	15.0	8.9	3.0	80
C	200	21.5	12.5	3.6	83
D	200	34.0	24.0	6.8	80
A	300	5.0	4.4	1.8	64
B	300	14.0	10.3	3.5	75
C	300	25.0	20.1	6.2	75
D	300	32.0	29.7	9.2	72
A	200	6.0	4.5	1.4	77
B	200	11.5	5.9	2.2	81
C	200	21.5	13.5	4.9	78
D	200	27.0	14.4	5.4	80
A	300	5.6	4.5	1.6	72
B	300	12.8	7.0	3.7	71
C	300	24.5	15.0	7.0	69
D	300	22.0	14.5	6.0	73

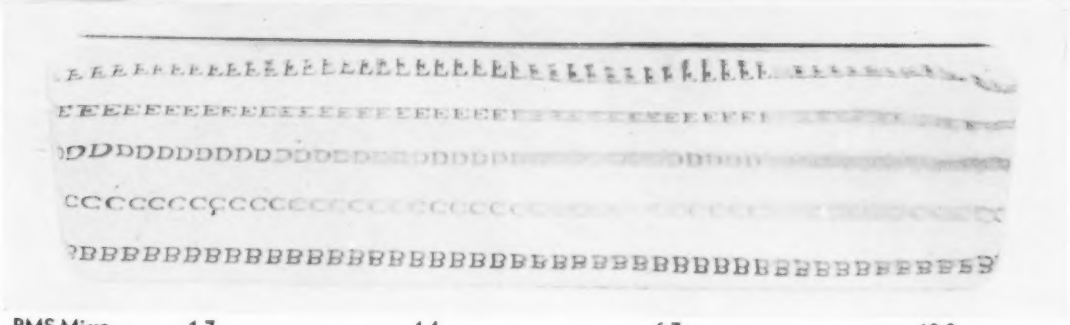
(a) The conditions for zinc plating and the bath composition corresponded to the conditions and bath composition detailed in Table 2. The thickness of each zinc plate averaged 0.002 inch.
(b) Four bands, approximately 1-1/2 inch wide were introduced on the surface of each die casting as follows:
Band A—Polished (by hand) with 600-grit emery paper or with No. 000 metallographic paper
Band B—Polished (by hand) with 320-grit emery paper
Band C—Polished (by hand) with 240-grit emergy paper
Band D—Polished (by hand) with 180-grit emery paper
(c) Each figure in the average of approximately 3 readings for each band.
(d) Each die casting was electropolished for 4 minutes at 200 amp/sq ft, except where otherwise noted.
(e) After plating with an average of 0.002 inch of zinc, each die casting was plated with 0.0001 inch of copper in a conventional copper cyanide strike bath and with 0.0008 inch of bright nickel.

electropolishing were not always filled or bridged by the copper plate; thus, surface pits were visible, at least on some die castings, thereby detracting not only from appearance but also from corrosion resistance.

(2) Cost estimates indicated that only a very small part, if any, of the total casting, trimming, polishing, buffing and plating costs could be saved by substituting electropolishing and leveling copper plating (0.001 inch, minimum) for buffing and conventional copper plating (0.0003 inch).

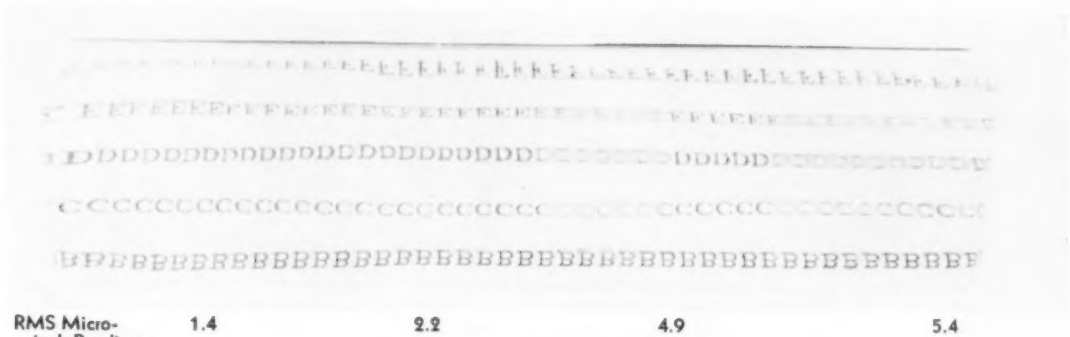
Because zinc costs less than copper, efforts next were concentrated on identifying a leveling zinc plating bath. No significant leveling was observed for plate as thick as 0.002 inch deposited in zinc cyanide solutions even when the current was reversed periodically. However, an acid solution known to have good pore filling power from previous research on electroplating porous powder compacts[1] was the basis for the further development of a leveling zinc process that offers promise for eliminating buffing.

The best plating bath and the best operating conditions for depositing high-purity leveling zinc plate, which was



RMS Micro-inch Readings 1.7 4.4 6.7 12.0

Electropolished 15 Seconds Before Plating



RMS Micro-inch Readings 1.4 2.2 4.9 5.4

Electropolished 4 Minutes Before Plating

Fig. 3. Image reflections from die-cast panels plated with 0.0015 inch of leveling zinc, 0.0003 inch of copper, 0.0005 inch of bright nickel and 0.00001 inch of conventional chromium. Two bands of fine polishing scratches are on the left and two bands of rough polishing scratches on the right, as for Fig. 2.

TABLE IV

PROCEDURES FOR PLATING ZINC, COPPER, NICKEL AND CHROMIUM ON DIE CAST PANELS[a]

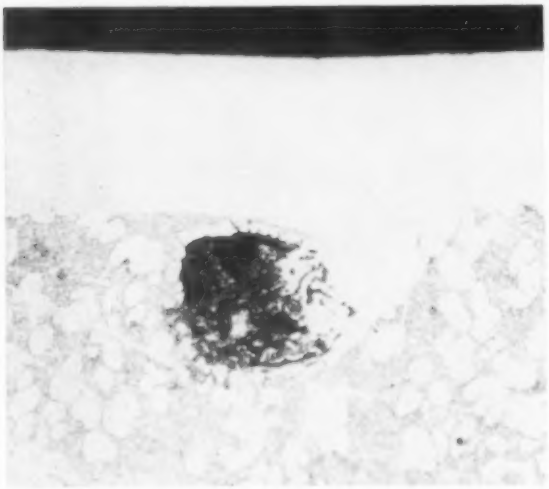
Electroplate	Bath Composition	Bath Temperature F	Cathode Current amp/sq ft	Plating Time, minutes
Leveling zinc	See Table II	114 to 118	250	30 (0.0015 in. plate)
Copper	18 oz/gal KCN[b] 11 oz/gal CuCN 4 oz/gal KOH Supplementary brighteners	170 to 178	40	8 (0.0004 in. plate) 14 (0.0007 in. plate)
Bright nickel	43 oz/gal $NiSO_4 7H_2O$[c] 8 oz/gal $NiCl_2.6H_2O$ 5.5 oz/gal H_3BO_3 11 ml/gal wetting agent Supplementary brighteners	140 to 145	75	16 (0.0008 in. plate) 26 (0.0013 in. plate) 32 (0.0016 in. plate)
Conventional Chromium	36 oz/gal CrO_3 0.40 oz/gal H_2SO_4	105	150	2 (0.00001 in. plate)
Bright, crackfree, chromium (Procedure IL)[d]	50 oz/gal CrO_3 mixture	120	220 to 290	6 (0.00008 in. plate)
Bright, Crackfree chromium (procedure IM)[e]	33.5 oz/gal CrO_3 0.19 oz/gal H_2SO_4	130	300[f]	8 (0.00008 in. plate)

(a) Except for the panels plated with zinc, all panels were polished and buffed and edges were strapped to remove trimming-die burrs. After wiping with trichlorethylene and scrubbing with magnesium oxide, the panels were racked in a plastic edge shield to improve plate thickness uniformity. After anodic cleaning for 30 seconds at 15 amp/sq ft, the panels were rinsed and dipped for about 10 seconds in a 1 per cent solution of sulfuric acid. After rinsing in tap water, copper was deposited about 0.00005 inch thick in 2 minutes at a current density of 60 amp/sq ft in the following strike bath:

Sodium cyanide, NaCN	4 oz/gal
Copper cyanide, CuCn	2.5 oz/gal
Sodium carbonate, Na_2CO_3	2 oz/gal
Rochelle salts	3 oz/gal
pH	About 11.5
Free sodium cyanide	0.9 to 1.6 oz/gal
Temperature, F	125

(b) Free potassium cyanide was maintained at 2 to 2.5 oz/gal; the work-bar was agitated at 30 cpm with a 3-inch stroke and the bath was agitated with air; the current was reversed for 10 seconds after each 60-second direct plating cycle; cast of the copper anodes were bagged in nylon.
(c) The pH was maintained in the range of 2.7 to 3.3; the bath was agitated with air and the work bar was agitated at 30 cpm with a 3-inch stroke; cast carbon nickel anodes were bagged in nylon; after nickel plating, the panels were cathodically cleaned, rinsed and dipped in 30 per cent sulfuric acid solution to prepare them for chromium plating.
(d) This chromium was plated in the Detroit laboratory of the Metal and Thermit Corporation.
(e) The CrO_3-H_2SO_4 ratio was within the range recommended in Reference 3.
(f) Parts were immersed with a jumper contact and voltage was adjusted to about 2.5 v for the first 15 sec; thereafter the voltage was raised to 7 to 8 v to adjust the current density to 300 amp/sq ft.

identified after an extensive study is given in Table II which also shows the effects of changes in the current density. By employing this bath with periodically reversed current, an excellent appearance was produced with unbuffed die castings that were electropolished and plated with 0.001 to 0.002 inch



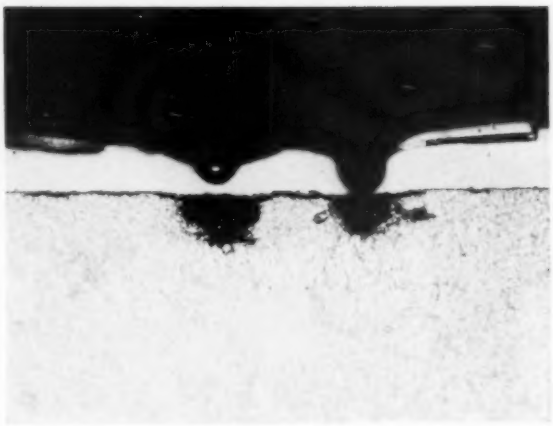
Light Picral Etch 500 X

Light Picral Etch 500 X

Fig. 4. Cross sections of die castings plated with zinc, copper, nickel and chromium, showing good pore-filling power for the leveling zinc.

of the leveling zinc, 0.0001 or 0.0003 inch of copper, and 0.0005 or 0.0008 inch of bright nickel.

The exceptionally good leveling power of the zinc plate is illustrated photographically in Fig. 3 and statistically in Table III. Moreover, an excellent pore-filling power was recognized from metallographic studies. Fig. 4 shows cross sections of typical basis metal surface pits filled with zinc. Such pits usually are not filled with copper or nickel plate as is shown by Fig. 5. This comparison indicates that



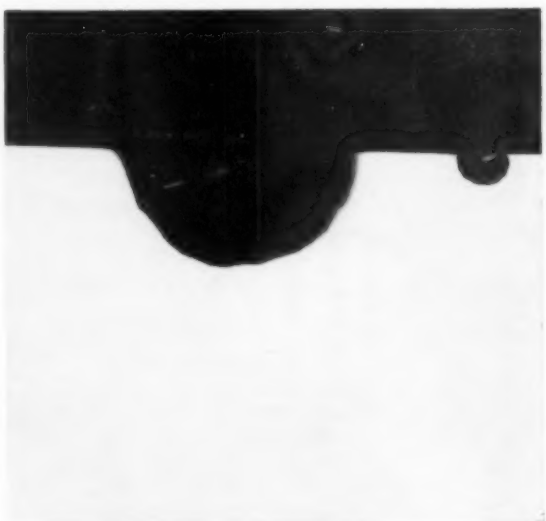
250 X

Fig. 5. Cross section of copper- and nickel-plated die casting showing pits in the plate over surface pores in the casting. The failure if the copper plate in filling these surface pores is attributed to the entrapment of alkaline cleaning or acid solution from the cleaning or acid dipping baths preceding the copper plating step.

blistering due to entrapment of plating solution in basis-metal surface pits probably can be eliminated by taking advantage of the good pore-filling power of the leveling zinc plating process.

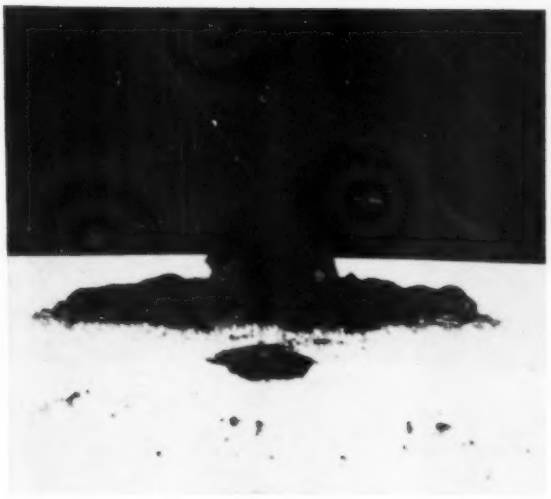
HOW ELECTROPLATED DIE CASTINGS CORRODE

As one part of the research aimed at improving corrosion resistance, many electroplated die castings were examined with the objective of determining the mechanism or corrosion and devising procedures for eliminating or delaying the appearance of blisters and other corrosion defects. One of the most significant observations from this study was the



1000 X

Fig. 6. Cross section of surface pits caused by corrosion of nickel plate under pits or cracks in conventional chromium plate. The large pit penetrates about one-half of the nickel plate. The cross sections shown in Figs. 6, 7 and 8 were taken from service ports exposed for three months outdoors in an industrial atmosphere.



500 X

Fig. 7. Cross section of pinpoint corroded area representative of an advanced stage of pitting in nickel plate. The nickel corroded laterally when pitting reached the copper interface.

occurrence in large numbers of surface pits penetrating only part way through the nickel plate, like the pit illustrated in Fig. 6. The frequency of such pits invariably exceeded the frequency of basis metal corrosion defects in any given area. Even the electroplated die castings showing no basis metal corrosion when removed from service were covered with a sprinkling of microscopic surface pits penetrating part way through the nickel plate. The evidence confirmed the concept that corrosion usually begins in the nickel, under pits or cracks in the chromium. The nickel is more active galvanically than the chromium plate, so pitting continues until the nickel is penetrated completely. The accelerating effect of chromium plate on pitting in nickel has been noted previously.[2, 3]

Metallographic examination of many corrosion pits and blisters revealed that the nickel usually corrodes laterally when the copper interface is reached, as illustrated by the pinpoint in Fig. 7. When the copper is perforated, the zinc die cast metal corrodes rapidly, raising blisters like that shown in Fig. 8.

Profuse surface pitting was observed in nickel under chromium as thick as 0.00003 inch. Furthermore, nickel and copper as thick as 0.001 and 0.0006 inch, respectively, on the parts sampled from one industrial area were perforated completely in less than 3 months.

The results of this study suggested that improved chromium plate free of pits and cracks would be the best procedure for improving the corrosion resistance of electroplated die castings. It appeared that corrosion could be eliminated by providing a chromium plate capable of protecting the nickel and preventing it from pitting.

PROCEDURES FOR IMPROVING CORROSION RESISTANCE

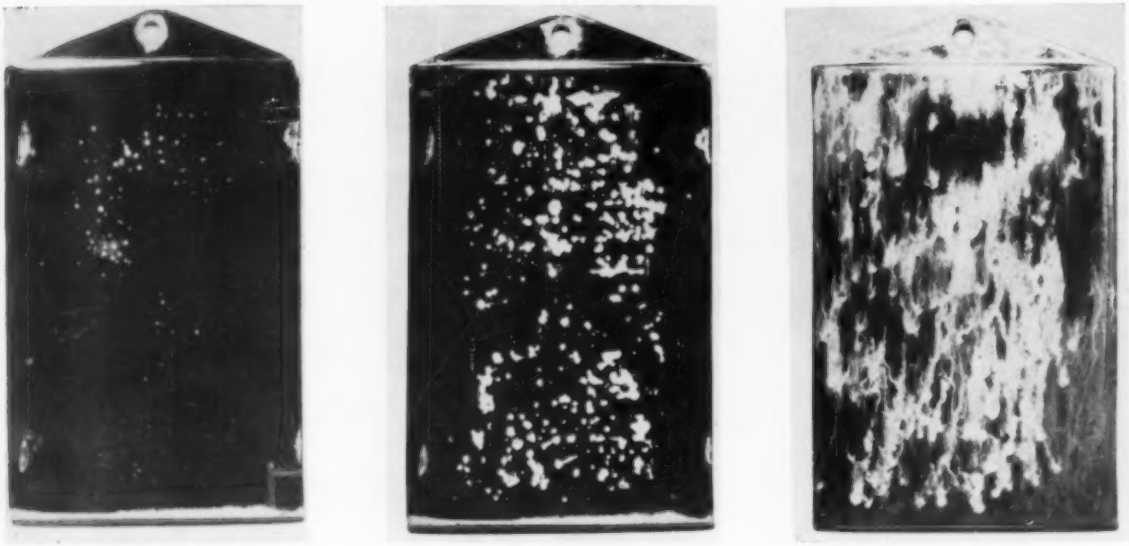
The initial study aimed at improving corrosion resistance included several different combinations of electroplates. For example, procedures were selected for determining the effects of: (1) increasing the thickness of the copper and nickel plate, (2) interposing leveling zinc plate between the zinc basis metal and the copper plate, and (3) replacing conventional chromium with thicker chromium deposited in crackfree form. Five lots of five, 4 x 6-inch die cast panels corresponding to each procedure being investigated were plated as described in Table IV. Two lots were subjected to accelerated corrosion and the other three were exposed outdoors.

The accelerated tests included the Corrodekote and the 192-hour acetic acid salt spray tests.* The Corrodekote test consisted of brushing a synthetic corrosive mud on the parts to be evaluated and placing the parts in a humid atmosphere for 20 hours. The mud slurry contained cupric nitrate, ferric chloride, ammonium chloride and Kaolin. In normal practice, zinc die castings are mud coated only once and exposed for only 20 hours. Like the 192-hour acetic acid salt spray test, Corrodekote testing caused blistering and cratering on incompletely protected zinc die castings. However, the salt spray environment caused more corrosion than one cycle of Corrodekote testing. Recycling the Corrodekote tested

* The testing procedures are described in detail in Reference 4.

Fig. 8. Cross section of blister representative of final stage of corrosion for electroplated zinc die castings.

1000 X



One Cycle Corrodekote Test | Two Cycles Corrodekote Test | 192 Hours Acetic Acid Salt Spray

Fig. 9. Representative panels plated with 0.0004 inch of copper, 0.0008 inch of nickel and 0.00001 inch of conventional chromium.

panels a second time introduced more corrosion. As a result, the corrosivity of Corrodekote exposure approached the corrosivity of the 192-hour acetic acid salt spray test.

The ratings after one and two cycles of Corrodekote exposure are compared in Table 5 with the ratings for duplicate panels exposed in the salt spray cabinet. Table 5 also includes the ratings for the panels exposed for 19 weeks' in Detroit and the panels exposed for 23 weeks' at Kure Beach. The Detroit exposure from January 16 to May 27, 1958 caused nearly as much corrosion as one cycle of Corrodekote testing.

BRIGHT, CRACKFREE CHROMIUM PROTECTS AGAINST CORROSION

The performance of the bright, crackfree chromium in improving the corrosion resistance of electroplated die

TABLE V

RATING SUMMARIES FOR OUTDOOR EXPOSURE AND ACCELERATED CORROSION TESTS ON ELECTROPLATED DIE CAST PANELS

Procedure Identification	Thickness of Electroplates			Detroit Exposure Ratings[a]	Kure Beach Exposure Ratings[b]	Corrodekote Test Ratings[c]		Salt Spray Test Ratings[c]
	Copper, inch	Nickel, inch	Chromium inch			One Cycles	Two Cycles	
I A	0.0004	0.0008	0.00001	7.7	9.0	7.8	5.2	3.0
I B	0.0007	0.0013	0.00001	9.0	8.6	8.1	5.6	3.6
I C	0.0004	0.0016	0.00001	9.2	9.0	8.8	7.4	4.4
I E	0.0004[d]	0.0008	0.00001	8.6	8.8	9.9	6.8	4.4
I L	0.0004	0.0008	0.00008	10.0	9.6	9.6	9.2	9.7
I N[e]	0.0004	0.0008	0.00008	—	—	9.4	8.8	8.7

(a) Average of ratings for 5 panels after 19 weeks' exposure; the rating system was applied on a weighted area basis for specific corrosion defects and was similar to that employed by ASTM Committee B8 in evaluating the performance of electroplated panels; a rating of 10 corresponds to panels showing less than 0.04 per cent area affected by corrosion; and lower ratings apply to panels showing more corrosion.
(b) Average of ratings for 5 panels after 23 weeks' exposure.
(c) Average of ratings for 5 or more panels; the rating system corresponded to that employed by ASTM Committee B8, adapted from the procedure given in ASTM Designation D610-43.
(d) Preceded with 0.0015 inch of leveling zinc plate.
(e) Panels plated by this alternative procedure have not yet been exposed outdoors.

One Cycle
Corrodekote Test

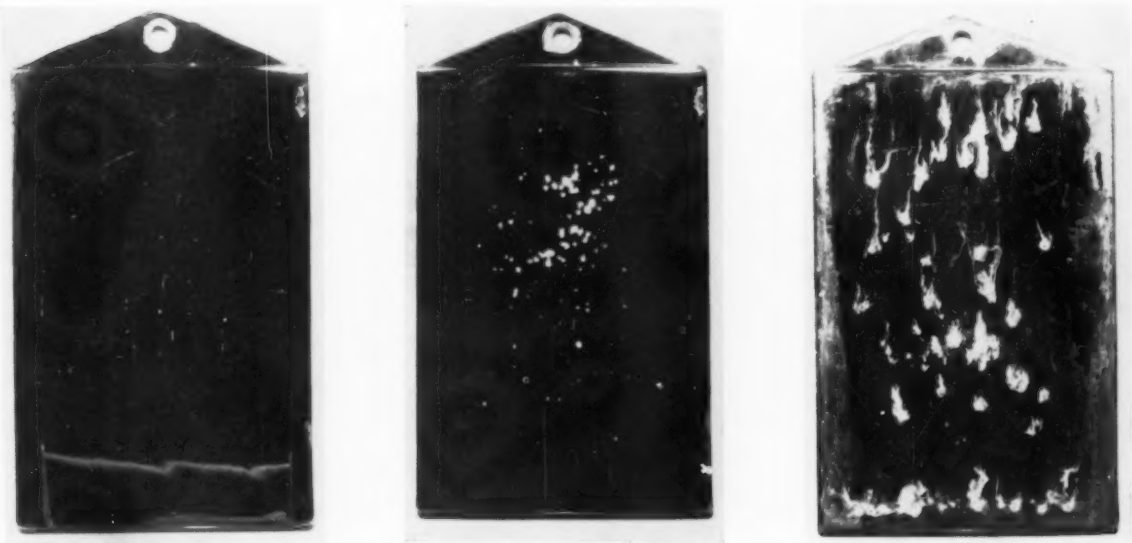
Two Cycles
Corrodekote Tests

192 Hours
Acetic Acid Salt Spray

Fig. 10. Representative panels plated with 0.0007 inch of copper, 0.0013 inch of nickel and 0.00001 inch of conventional chromium.

castings was the most outstanding result of the accelerated testing and exposure program. Both electroplating systems that included a bright, crackfree chromium plate furnished more protection than the other plating systems. The justification for this conclusion is illustrated by the photographs in Figs. 9 through 14, which show representative panels subjected to the accelerated corrosion program.

Increasing the thickness of copper and nickel was less effective in preventing corrosion than increasing the thickness of the chromium. On the other hand, the performance of the panels plated with leveling zinc was encouraging. The corrosion resistance of complexshaped castings produced for automotive service probably would be benefited even more by the leveling zinc plate than were the flat test panels, which showed only very shallow surface pits by contrast with production parts often marred by deep surface pits.

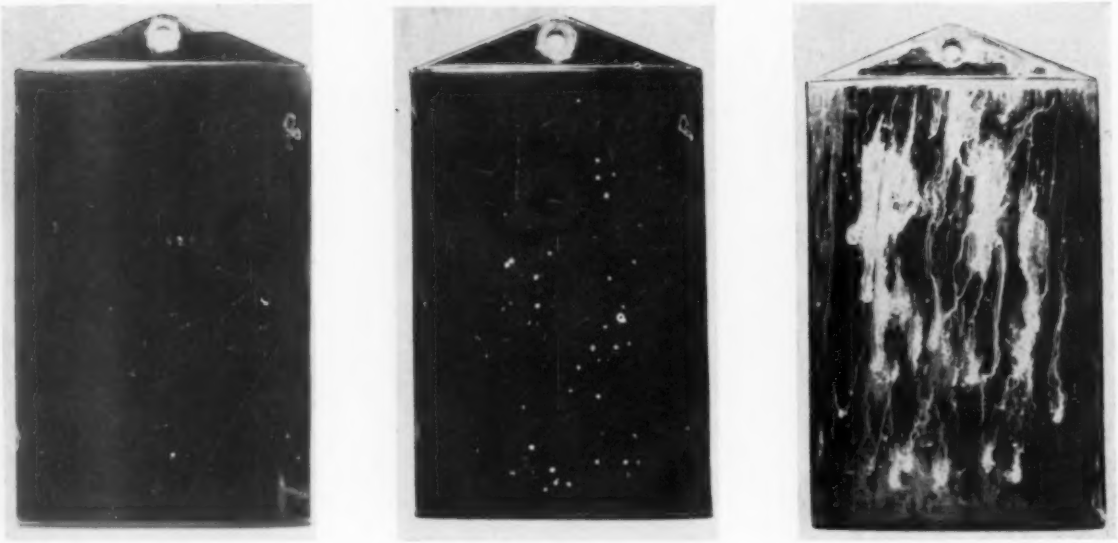


One Cycle
Corrodekote Test

Two Cycles
Corrodekote Test

192 Hours
Acetic Acid Salt Spray

Fig. 11. Representative panels plated with 0.0004 inch of copper, 0.0016 inch of nickel and 0.00001 inch of conventional chromium.

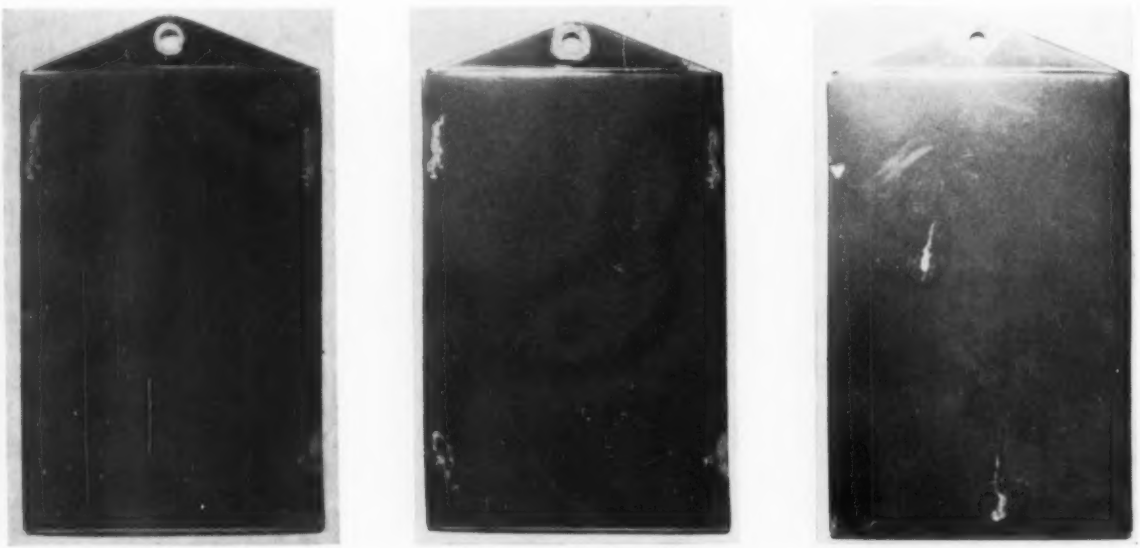


One Cycle Corrodekote Test | Two Cycles Corrodekote Test | 192 Hours Acetic Acid Salt Spray

Fig. 12. Representative panels plated with 0.0015 inch of leveling zinc, 0.0004 inch of copper, 0.0008 inch of nickel and 0.00001 inch of conventional chromium.

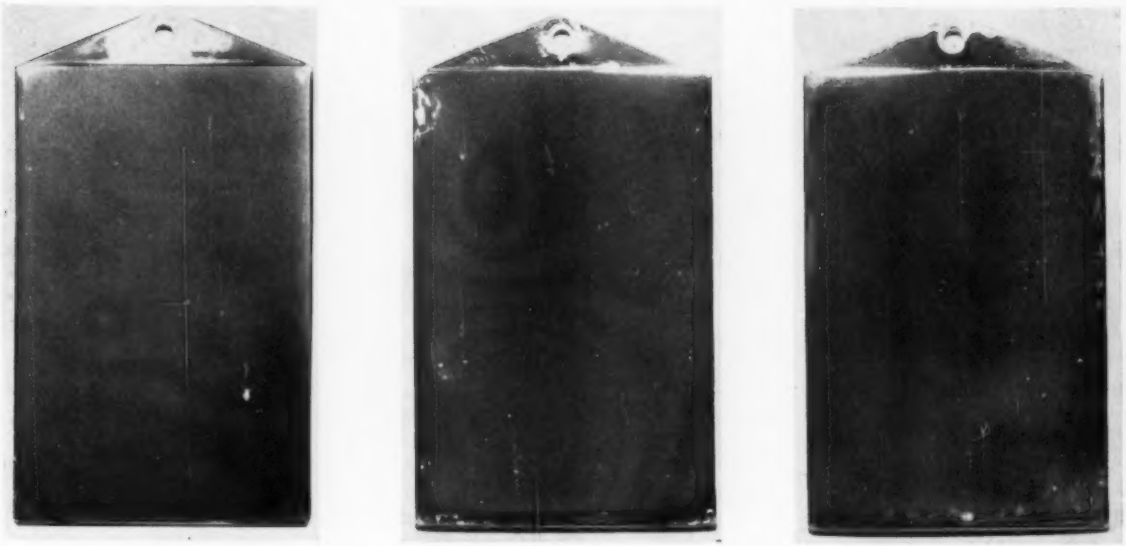
The panels exposed to weathering in Detroit showed more corrosion than duplicate sets at Kure Beach, North Carolina or Columbus, Ohio. Thus, outdoor exposure at Kure Beach and Columbus must be continued before even preliminary conclusions can be drawn for these environments. Of course, the Detroit weathering test also will be continued.

In view of the good results obtained in the accelerated exposures with bright, crackfree chromium plates, research now underway includes a study of the influence of the chromium plate thickness. The effect of decreasing the thickness of the bright nickel under the chromium will be investigated. Evaluation of duplex nickel coatings will be continued and a study of procedures for plating nickel directly on zinc will be initiated.



One Cycle Corrodekote Test | Two Cycles Corrodekote Test | 192 Hours Acetic Acid Salt Spray

Fig. 13. Representative panels plated with 0.0004 inch of copper, 0.0008 inch of nickel and 0.00008 inch of bright, crackfree chromium (Procedure IL).



One Cycle
Corrodekote Test

Two Cycles
Corrodekote Test

192 Hours
Acetic Acid Salt Spray

Fig. 14. Representative panels plated with 0.0004 inch of copper, 0.0008 inch of nickel and 0.00008 inch of bright, crackfree chromium (Procedure IM).

ACKNOWLEDGMENTS

The authors acknowledge with appreciation the permission of Battelle Memorial Institute and the American Zinc Institute to publish the information in this paper. Special acknowledgment is due to H. R. Miller, who assisted in the research, and the members of the AZI research committee on electroplated finishes for their helpful guidance in planning and conducting the research. The Committee included E. A. Anderson, New Jersey Zinc Company; R. C. Bell, Consolidated Mining Company of Canada; M. R. Caldwell, Doehler-Jarvis Division of National Lead Company; J. L. Kimberley, American Zinc Institute; and A. A. Smith American Smelting and Refining Company.

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MODERN ORGANIC FINISHES

With Special Emphasis on Coatings for High Temperature and Abrasive Protection†

by M. A. GLASER and E. J. BROMSTEAD*

HISTORY

ORGANIC COATINGS HAVE PROBABLY been used for the protection of decomposition-prone substrates since the days of primitive man. Even before the time of the Biblical patriarch Noah (circa 3500 B.C.) who followed God's injunctions and "pitched the ark (of gopher wood) within and without with pitch,"—there is evidence that early man employed whatever organic coatings were locally available to him for the purpose of decorating and protecting his prized possessions.

Table I shows some of the organic coating materials used in the past.

It may be recalled that even as recently as a generation or two ago, many of the types of coatings shown in Table I were still being used. With the unprecedented growth of American industry in the past approximately 30 years, profound changes occurred in the chemical industry and hence many new types of organic coatings were created and are now available. Some of these new coating types are already being used in this "Missile Age" and still better coatings are being sought and developed.

MODERN VEHICLES AND THEIR PROPERTIES

Table II shows a list of some of the synthetic vehicles available for organic coatings today.

The number of variations possible by chemical and physical modifications in each category approach the infinite. For alkyd resins alone, the polybasic acids industrially available today number about two score, the number of different polyhydric alcohols about the same and the number of other modifiers which may be and are being used are substantially without limit.

The utility of the various film formers for specific organic coatings may be roughly established with the Vehicle Guide shown on Table III.

An evaluation of some of the newer types of polymers was recently conducted, and it was thought that the results would be of interest. These findings apply only to the specific compositions used and would not necessarily apply to all compositions of the indicated types. For instance, some of the compositions shown on Table IV will perform better over a primer and indeed some of these coatings are intended for use over a primer for optimum resistance to humidity and salt spray.

In considering organic coatings for this modern age, the property of abrasion resistance is frequently an important factor. Table V shows the abrasion resistance comparison of some of the newer types of polymers examined.

Table V shows fairly good correlation between falling sand and Taber ratings. This has not been the case with other comparisons made of the two methods in the past. It should also be noted that the 160F Taber tests are not considered completely reliable because (1) some coatings caused "gumming" of the abrasive wheel and (2) there was evidence that the abrasive wheels themselves wore abnormally under the elevated temperature of the test.

These tests do, however, tend to point out that the types of organic coating required for optimum abrasion resistance

TABLE I
SOME ORGANIC COATINGS OF THE PAST

Approximate Year	Place	Coating	Uses
4000 B.C.	Asia Minor	Pitch (rosin or asphalt)	Waterproofing ships
4000 B.C.	Egypt	Balsams, gum arabic, egg white, egg yolk—pigmented with earth and manufactured pigments	Waterproofing preserving coffins, chariots
2500 B.C.	Syria Babylon	Natural asphalts	Waterproofing, preserving chariots
1500 B.C.	Egypt	Colored paints	Decorating furniture
350 B.C.	Greece	Oil and water bound paints	Decorating furniture
25 B.C.	Rome	Clear and pigmented lime and litharge-treated linseed oil finishes	Decorating and graining furniture
100 A.D.	China	Varnish tree sap	Furniture, etc. finishing
500 A.D.	Mexico (Mayan)	Paints made from pheasant egg white	Miscellaneous
700 A.D.	Europe	Varnish	Painting medium
1000 A.D.	North America (Indian)	Paints made from fish oil and chewed salmon eggs	War paints, canoe paints
1200 A.D.	India	Shellac varnish	Miscellaneous finishing
1500 A.D.	Italy	Linseed-fossil gum varnish	Protecting armor, bows, violins, etc.
1750 A.D.	England France	Linseed-fossil gum varnish	Furniture varnishes

*Midland Industrial Finishes Company, Waukegan, Illinois.

†Various portions of this paper were presented by E. J. Bromstead before the Rockford Branch, American Electroplaters' Society, on March 15, 1958, by M. A. Glaser before the Midland, Michigan, Coatings Society, May 13, 1958.

TABLE II

SYNTHETIC RESINS FOR ORGANIC COATINGS TODAY

Acrylic
Alkyd
Allyloxybenzenetrimethylol
Amine-Formaldehyde
Cellulose Acetate
Cellulose Acetate Butyrate
Cellulose Nitrate (Low Viscosity)
Chlorinated and other solubilized rubbers
Cumarone Indene
Epoxy
Ethyl Cellulose
Hydrocarbon
Phenolic
Polyamide
Polyester
Silicone
Styrenated Alkyd
Terpene
Unsaturated Polyester
Urethane
Vinyl
Zein
Interpolymers of two or more of the above

should be carefully selected and that coatings which have good abrasion resistance at ambient temperature may not perform comparably at elevated temperature.

METHODS OF APPLICATION

Much of the effectiveness of an organic coating depends on the manner in which it was applied. Let us now take a look at Table VI for newer methods for applying organic coatings.

PREPARATION OF SURFACES

It should be emphasized that, for optimum performance, metals must be perfectly clean or chemically treated before the application of an organic coating. Many times a carefully engineered and highly resistant coating fails miserably

TABLE III

VEHICLE GUIDE—APRIL, 1958

Desired Property	Resin to Use*
Abrasion Resistance	Vinyl, alkyd-amine, chlorinated rubber, epoxy, urethane
Acid Resistance	Chlorinated rubber, vinyl, hydrocarbon, phenolic, acrylic, epoxy
Alkali Resistance	Hydrocarbon, vinyl acrylic, phenolic, chlorinated rubber, epoxy ethyl cellulose, styrene, melamine-formaldehyde, styrenated alkyd; styrene, vinyl, etc., latices
Color Retention	Silicone, acrylic, non-drying oil alkyd, amine-formaldehyde, cellulose acetate butyrate, vinyl acetate
Fast Air Dry	Nitrocellulose, chlorinated rubber, styrenated alkyd, alkyd, ethyl cellulose, catalyzed urea, phenolic, epoxy, etc.
Fast Baking	Amine-formaldehyde, styrenated alkyds, chlorinated rubber, thermosetting and catalyzed phenolic, styrenated and catalyzed epoxy, styrene, vinyl, etc., latices
Flexibility	Alkyd, vinyl, ethyl cellulose, vinylidene chloride, solubilized rubbers
Hardness Absence-of-Tack when Warm Mar-Proofness	Amine-formaldehyde, thermosetting phenolic, nitrocellulose
Heat Resistance	Silicone, acrylic, saturated alkyd, epoxy, triazine-formaldehyde, tetrafluoroethylene, trifluorochloroethylene, vinyl butyral
Low Cost	Tall oil vehicle, styene-modified vehicle, ester gum, hydrocarbon, some natural resins
Oil and Grease Resistance	Vinyl, cellulose acetate, zein, polyamide, phenolic, amine-formaldehyde, cellulose nitrate
Outdoor Durability	Silicone, 100 per cent phenolic, methylene disalicyclic acid alkyd, alkyd, cellulose acetate, cellulose aceto-butyrate, silicone alkyd, acrylic
Salt Spray Resistance	Vinyl, epoxy, chlorinated rubber, phenolic, acrylic, alkyd
Water Resistance	Vinyl, epoxy, chlorinated rubber, acrylic, phenolic, silicone, hydrocarbon, alkyd

*Key Resin is shown. Should be combined with others if and when necessary.

TABLE IV

PROPERTIES OF SOME NEWER COATINGS

General Type	Cure	Humidity (100 Per Cent RH @ 100F)	Salt Spray (5 Per Cent @ 95F)	Impact	260 Hr @ 70F: 5 Per Cent NaOH	4 Per Cent HAC	5 Per Cent H_2SO_4	Oleic Acid
Alkyd-Amine	I	E	F-G	F-G	G	E	E	E
Epoxy Phenolic	II	E	G	E	E	E	E	E
Epoxy Polyamide	I	E	G	E	E	P	P	P
Epoxy Urea	I	E	G	E	E	E	E	E
Catalyzed Epoxy	I	E	E-G	E	E	F-G	E	E
Urethane	III	G	F	E	F-G	E	E	E
Urethane	III	E	F	E	E	E	E-G	E
Urethane Oil	I	E-G	F	E	P	P	E	E

I = 30 min @ 300F
II = 30 min @ 400F
III = 30 min @ 350F

E = Excellent
G = Good
F = Fair
P = Poor

Note: All tests 0.001 in. on phosphatized steel.

TABLE V

ABRASION RESISTANCE OF SOME NEWER COATINGS

General Type	Cure	Sand Abrasion (a) Ambient T, Lb	Taber Abrasion (b) Ambient T, Weight Loss	Taber Abrasion (b) Weight Loss 160F
Vinyl Alkyd	I	355 (5)	0.0458 (7)	0.0367 (8)
Vinyl Acrylic Alkyd	II	200 (8)	0.0439 (6)	0.0005 (2)
Chlorinated Rubber Alkyd	Air Dry	200 (7)	0.0650 (8)	0.0261 (7)
Alkyd-Amine (Abrasion Resistant)	I	340 (6)	0.0213 (5)	0.0183 (5)
Epoxy-Urea	I	450 (4)	0.0205 (4)	0.0215 (6)
Urethane Oil	II	200 (9)	0.100 (c) (9)	0.100 (c) (9)
Epoxy-Polyamide	II	500 (d) (1)	0.0018 (1)	0.0135 (4)
Urethane	II	500 (d) (2)	0.0070 (2)	0.0003 (1)
Catalyzed Epoxy	Air Dry	500 (d) (3)	0.0191 (3)	0.0079 (3)

I = 30 min @ 350F
II = 30 min @ 325F
(a) per ASTM specification D 968-51.
(b) CS 10 wheel, 1000 g load, 1000 cycles.
(C) Extrapolated figure—wore through at 400 cycles.
(d) Film intact after indicated lb sand.
Note: Numbers in parenthesis show relative rating on the specific test. (1) Equals best abrasion resistance, etc.

in its exposure environment ONLY because the metal substrate was improperly prepared. Remember,—a 0.001-0.010 in. organic coating is being asked to protect a metal part many times greater in thickness. The *least* that can be done is to properly and carefully prepare the metal surface to be coated.

Metal substrates for organic coatings may be roughly divided into two types: ferrous and non-ferrous.

In the former are hot and cold rolled steels, phosphatized steel, polished steel, stainless steel, etc.

The latter class includes aluminum, copper, magnesium, cadmium, chromium, zinc, brass, tin and nickel and their alloys. Plated metals are usually coated as you would coat the plate itself.

Practically all the aforementioned surfaces require different species of organic coatings. Rare is the lacquer or enamel which will have good adhesion to all of the many surfaces mentioned. When it is considered that most organic surface coatings must do much more than merely adhere, it is not strange that thousands of different formulations are required to completely cover the consumer demands for organic finishes.

TABLE VI

NEWER METHODS FOR APPLICATION OF ORGANIC COATINGS

I. Electrostatic spraying and dipping.
II. Automatic spraying.
III. Hot spraying.
IV. Steam spraying.
V. High pressure spraying.
VI. Two component spraying for
  A. Textured finishes.
  B. Catalyzed finishes of relatively short "pot life."
VII. Continuous, high speed "strip coating."
VIII. High speed roller coating—100 or more sheets of approximately 30 by 32 in. per min.
IX. "Aerosol" spraying.
X. Flow coating.
XI. Knife coating.
XII. Pour coating.

SPECIFIC RECOMMENDATIONS

Table VII shows the important types of lacquers for use over steel.

Table VIII shows the important types of lacquers for use over brass.

When the substrate has been specified, the next requirement to be considered is whether the finish shall air dry or bake and if baked how long and at what temperature. Wherever possible, a suitable baking schedule should be provided as thermally cured finishes nearly always give better performance than air dried finishes.

SURFACE TEXTURE AND COLOR OF ENAMELS

Texture and color are two features that are used to promote eye and sales appeal in manufactured articles today. Everyone is aware of the part color plays in modern merchandising.

TABLE VII

LACQUERS FOR STEEL

Most Important Types	Comments
Chlorinated rubber: modified with alkyds, chlorinated diphenyls, oils, chemical plasticizers.	Excellent chemical resistance. Stabilizers added for best durability and light resistance.
Styrenated and acrylic modified alkyds.	Excellent adhesion and build.
Nitrocellulose and alkyds.	Adhesion generally good, but borderline cases helped by additions of phosphoric acid.
CAB + alkyds.	Useful in clears for good outdoor weathering.

TABLE VIII
LACQUERS FOR BRASS

Most Important Types	Comments
Nitrocellulose + alkyds, damar, shellac, VYCC, many other resins.	Almost all nitrocellulose types have a naturally strong affinity for brass. Citric acid, etc., useful to prevent "greening."
VMCH-vinyl-(maleic modified) copolymer.	Good chemical resistance.
Acrylate and methacrylates.	Best color and color retention. Adhesion improves on baking.
Butyral + alcohol soluble resin blends, e.g., "A" stage phenolics.	Excellent adhesion, perspiration, and chemical resistance improves on heating or aging.

It is a distinct facet of the paint chemist's job to pick from among the thousands of the colored pigments available to the paint industry, the one pigment or blend of pigments that "does the job." To do this one must know how to mix colors to match a specified shade, and know something about the durability, light-fastness, heat resistance and compatibility of the pigments he uses. At times it may be necessary to design an entirely new shade for a new product coming on the market.

Surface texture is a useful coating property for several reasons. First, for eye-appeal. It serves to break up the monotony of large, smooth surfaces. Secondly, it covers a multitude of surface defects inherent in most metal articles, such as scratches, abrasive wheel marks, welds, etc. Thirdly, by coating an object with a textured finish, one makes that object easier to hold in the hands—less slippery when wet. The oldest of the texture finishes is the wrinkle finish, and quantities of this particular type of textured coating are still being used because it fulfills the three requirements mentioned previously. Wrinkle finishes do have two main flaws, however. One is from the problems that arise in application—the requirements for uniform film thickness and baking conditions which are imperative for uniform wrinkle finishes. The other flaw is the difficulty in keeping a wrinkle-finished object clean.

The crackle finish is somewhat akin and is easier to clean because the folds are farther apart and less deep.

The two coat and the one coat hammer finishes give attractive patterns which are easily cleaned.

Spatter and veiled finishes are two coat systems which perform essentially the same functions.

A new innovation which has a pebbly, leather-like surface has recently come into general use. This is a one coat system which depends for its texture-effect upon surface tension differentials of the vehicle used. Pebble-texture organic coatings may be made in lacquer, conventional enamel, heat-resistant enamel and silicone enamel variations.

In some instances the primary function of a coating is merely that of decoration; however in the great majority of cases specific resistance properties are needed. Among these may be mentioned a few which are widely required such as resistance to heat, light, weathering, abrasion, detergents, perspiration, impact, color change, water, high humidity, salt spray, cold checking, etc. When the chemical resistances required of some coatings are added, the list becomes virtually endless.

COMPOSITION AND USAGE OF MODERN VEHICLES

Foremost in volume and utility among the organic coatings of today are the various modifications of the alkyd resins. These may be described as polyesters or polymers formed by reaction of polybasic acids and polyhydric alcohols. To be of use in surface coatings they are usually modified with vegetable oils or their acids, animal fatty acids or synthetic organic acids. For some applications they are modified "in situ" with rosin, phenolic groups, styrene, vinyl-toluene, acrylic, silicone or other reactants. In general, alkyds have the following properties which make them useful. They are low in cost, provide high solids content in enamels and lacquers, have good durability and color retention. Also they are amenable to modification with a number of other resins which improve features such as hardness, chemical resistance and abrasion resistance.

Perhaps 70 per cent of the manufactured metal articles used every day are coated with alkyds—modified generally with nitrogen resins, nitrocellulose or chlorinated rubber. Automobiles, aircraft, refrigerators, stoves, kitchen cabinets, cannisters, metal bed frames, hot water heaters, washing machines, dryers, these and a thousand other items depend for their beauty and long service on modified alkyds of one sort or another. Table IX shows some important properties of alkyd resins.

TABLE IX
ALKYD RESINS

Plus Features	Minus Features
Good durability.	Fair chemical resistance.
Good weatherability.	Relatively soft, unless modified with hard resins.
Good pigment wetting.	Thermoplastic.
High solids.	
Moderate-low cost per lb.	
Low cost solvent.	

Nitrocellulose, an ester of cellulose and nitric acid, is probably next in importance. Nitrocellulose forms solutions in mixtures of hydrocarbon diluents and esters such as butyl and ethyl acetate which are nearly water white in color. Because, by itself, it is hard and brittle and lacks adhesion to most substrates, nitrocellulose is nearly always modified with such resins as alkyds, amines, acrylics, with plasticizers and sometimes with hard rosin-derived resins. Table X shows some properties of nitrocellulose compositions.

TABLE X
NITROCELLULOSE

Plus Features	Minus Features
Fast dry.	Low solids.
Good hardness.	High cost solvent.
Pale color.	Inflammable.
Good durability	
Moderate cost.	

Undoubtedly, one of the prime reasons for the use of nitrocellulose lacquer is its ability to dry to a hard, tough film after a short force or air dry. This is a natural advantage in the wood finishing field, but is also advantageous in finishing large metal objects which would be difficult to bake. Acrylic-modified nitrocellulose lacquers are finding increased usage in the jet aircraft and related industries because such compositions have the additional advantage of being resistant to jet fuels and diester lubricants. Table XI shows some of the important properties of acrylics.

TABLE XI
ACRYLICS

Plus Features	Minus Features
Fume resistant.	High cost.
Heat resistant.	High cost solvent.
Outdoor durability.	Low solids.
Color retentive.	Poor shock resistance.
Water white.	Not compatible with many other resins.

Another good reason for using lacquers is the ease with which they may be retouched in the event of rejects. It is generally known that porcelain enamel is practically impossible to touch up, baked enamel is difficult and usually requires a special touch-up material, whereas nitrocellulose coatings may be repaired merely by applying the same lacquer to the damaged areas.

Vinyl resins are probably the next in importance. They are copolymers of vinyl chloride and vinyl acetate. Modifications are available which contain copolymerized maleic acid or vinyl alcohol, to improve adhesion and compatibility. Vinyl resins form solutions in aromatic hydrocarbons and ketones which are water white. Frequently, together with small amounts of chemical plasticizers and stabilizers the vinyls are bases for a number of coatings which have excellent chemical and abrasion resistance. On occasion, alkyd resins are used with certain compatible vinyl resins to increase the "build" and to modify film properties. Table XII lists the "plus" and "minus" features of vinyls.

TABLE XII
VINYL RESINS

Plus Features	Minus Features
Excellent abrasion resistance.	Low solids.
Good chemical resistance.	High cost solvent.
Excellent flexibility.	Chars when heated.
Water white color.	Poor solvent resistance.

One prominent field in which vinyl resins are finding increasing use is that of metal decorating. Here the properties of nontoxicity and particularly lack of taste, together with excellent forming ability, make it an outstanding type of resin. The common beer cans would probably be nonexistent without the vinyl resin lining used in them today.

An increasingly important application for vinyl polymers is in the field of organosol and plastisol coatings. These are dispersions (as opposed to solutions) of finely divided, high molecular weight vinyl resins in nonsolvents and/or plasticizers. They are used as thick films on such items as plating racks to withstand strong solutions and the abrasive action of metal parts. A somewhat recent application is as a texture finish for office furniture and business machines to give outstanding wear. For metal substrates a primer is usually required. In recent months one-coat organosols and plastisols have been introduced.

Phenolic resins are perhaps next from the point of view of interest. The polymers are condensation products of various phenols and formaldehyde. Available in several forms, the one we shall consider here is the alcohol soluble, thermosetting type. Of all the resins available to the coating industry, this one probably has the greatest degree of resistance to powerful chemicals and chemical solutions. Unfortunately, it does have some serious drawbacks. It is brittle, has a dark color, requires a high baking temperature and is relatively difficult to pigment. Table XIII tabulates some phenolic resin properties.

TABLE XIII
PHENOLIC RESINS

Plus Features	Minus Features
Excellent chemical resistance.	Dark color.
Excellent hardness.	Very brittle.
Good abrasion resistance.	High bake required.
Excellent solvent resistance.	

Phenolic resins are used with slight modification primarily in applications such as pipe, tank, pail and drum linings. Certain vinyl aldehyde resins and more recently epoxy resins are used to extend the flexibility of the phenolics. The phenolics offer a field for renewed study which could be very rewarding.

Epoxy resins are formed by the reaction of bisphenol and epichlorhydrin. Table XIV lists the general performance properties of this family of resins.

The terminal epoxide groups of these polymers are very reactive with a number of other compounds. Among these are aliphatic amines, thermosetting phenolics, urea resins and polyamide resins. Some uses for epoxy based coatings are in drum and pail linings, paints for ballast tanks in ships and two package patching compounds for repairing dented auto bodies. Esters of epoxy resins and long chain fatty acids are used in washing machine primers and on flat metal sheets which are subsequently formed into useful articles.

Cellulose acetate butyrate is a modification of cellulose acetate which is more soluble in common organic solvents. Some of its advantages are water white color, excellent dur-

TABLE XIV
EPOXIES

Plus Features	Minus Features
Alkali resistance.	Chalk on exterior exposure.
Excellent adhesion to many substrates.	High cost.
Chemical resistance.	Short pot life.
Good abrasion resistance.	
Solvent resistance.	

ability and color retention. It is used as a clear protective coating lacquer on metal objects.

Among the newer developments in the resin field are polyesters and polyurethanes. Polyesters are alkyd type resins made from dibasic acids and dihydric alcohols, one of which contains unsaturated double bonds. In the presence of catalyst, these are reacted with other unsaturated compounds such as styrene which cross-link to form complex polymers. Intensive work is now going on to better adapt these materials to surface coatings. One reason for using them is that they may provide 100 per cent solids enamels and varnishes—something that paint chemists have dreamed about for many years.

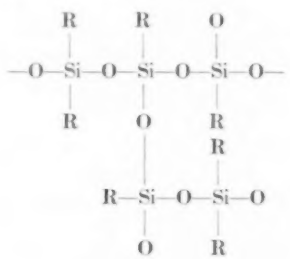
Polyurethanes are combinations of polyesters or other hydroxyl bearing materials and diisocyanates. These give promise of being useful vehicles for very hard, tough, chemical and abrasion resistant enamels and varnishes. Uses in organic coatings are still in their infancy in this country.

HEAT RESISTANT COATINGS FROM SILICONE RESINS

It is perhaps appropriate that some emphasis be placed on the subject of coatings for the so-called "missile age"—that is organic coatings which afford the heat and abrasion resistance required for aircraft, electronic and missile applications. Work in this broad field has been concentrated on coatings based on (1) silicone resins, their copolymers and modifications of these and (2) epoxy resin modifications.

Silicones may be thought of as hybrids between glass and organic resins. Like glass, they are formed by the chemical modification of sand or silica. To make glass, sand is fused with other inorganic oxides. Silicones are prepared from sand by replacing some of the oxygen linkages with hydrocarbon groups. In silicone chemistry, there are two important kinds of bonds. The Si-C bond, as in carborundum, is highly resistant to heat, water and oxygen, oxidizing only slightly even in oxy-hydrogen blast. The Si-O bond, as in quartz, is also highly resistant to heat, oxygen and water.

The chemistry of the silicone resins will not be discussed here except to show that chemically they are:

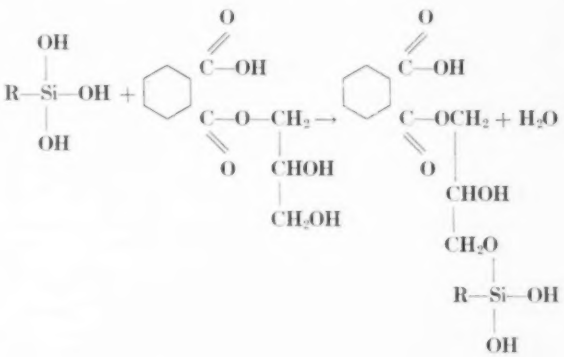


R may be saturated or unsaturated, alkyl or aryl, or any desired mixture.

Of the saturated organic groups, the methyls and the phenyls have been found to confer the best heat resistance. The high methyl silicone resins are fast drying and hard, but lack flexibility and adhesion. The high phenyl silicones are soft and dry to tacky films. They do, however, produce flexible and adherent films when properly cured. Many silicone resins lack compatibility with other silicone resins when attempts are made to cold-blend them. It seems natural, therefore, to expect that cross-linked silicone polymers where the R groups are partly methyl and partly phenyl would be the most useful members of this class of resins. This is generally found to be the case.

Polysiloxanes, where one or more of the R groups is an unsaturated group like vinyl or allyl, have been prepared and studied, but since the unsaturated linkages in such polymers are capable of undergoing further reactions, polysiloxanes containing such unsaturated groups have inferior heat resistance when compared to the methyl or phenyl types.

Another class of useful silicone derivatives is the silicone alkyds. Some authorities believe that silanol hydroxyls may combine with the excess or available hydroxyl groups in the alkyd, possibly by the following mechanism:



Similarly, silicones may be copolymerized with epoxy, acrylic, phenolic and other polymeric materials.

Silicone surface coatings look and behave like conventional organic coatings. They may be applied with the same equipment used for ordinary coatings by the usual methods such as brushing, spraying, dipping and roller coating. Silicone coatings may be air dried or cured by baking at temperatures up to approximately 500F; the exact curing cycle is determined by the composition of the vehicle used.

One of the successful applications of modern silicone coatings at this time is to provide heat, weather, electrical and corrosion resistance to ovens, stacks, furnaces, stove pipes, incinerators, automotive parts, electronic equipment and aircraft. These finishes are usually made from 100 per cent silicone or modified silicone vehicles and from carefully selected pigments. Skillfully formulated aluminum enamels made from conventional organic vehicles seem to withstand up to 1000F temperatures satisfactorily. They soon fail, however, when exposed to salt spray or weathering tests.

Durkin and Horner report some interesting findings in their study of aluminum pigmented silicone coatings to increase the high temperature life of steel. Mild steel, when heated to high temperatures, continues to oxidize until it is completely destroyed. With stainless steel, a protective oxide, which acts as a barrier against further oxidation, is formed. These investigators confirm that mild steel, protected with a silicone aluminum coating, may be used in temperature ranges where the steel would ordinarily be oxidized to failure. Even stainless steel needs protection if exposed continuously to temperatures of 1400–1600F. Silicone aluminum coatings provide the required protection. They also prevent oxidation at welded areas. Table XV shows the results obtained by Durkin and Horner at exposures of 930F.

The heat transfer characteristics of these silicone coatings contribute to their protective qualities. The same investigators placed identical 1-inch cubes of mild steel—one uncoated and one coated with a silicone aluminum finish—in a

TABLE XV

OXIDATION OF UNTREATED AND ALUMINUM SILICONE TREATED MILD STEEL AT 930F

(Durkin and Horner)

Exposure Time Hr	Weight Gain Mg/Sq Cm: Untreated Mild Steel (SAE 1010)	Weight Gain Mg/Sq Cm: Aluminum Silicone Treated Mild Steel
40	4.0	1.1
80	4.0	1.3
120	6.5	1.4
240	9.7	1.5
360	13.0	2.0
380	14.0	2.0
1000	—	No finish breakdown

1600F furnace. Thermocouples were affixed to the center of each cube, and after they had been in the oven for 10 minutes, the temperatures at the center of the cubes were measured. The uncoated cube had reached a temperature of 1550F while the coated cube recorded only 1095F.

A good, practical example of the advantages to be gained from the corrosion resistant and heat transfer properties of silicone coatings may be found in a Milwaukee case history. In 1952, a large manufacturer asked for a coating with which he could paint the insides of the many large ovens in his plant. He had been required to paint ovens twice a year to prevent rust formation lest the rust would fall from the sides and wickets and damage his ware. As a test case, one oven was completely cleaned and coated with a specially developed silicone aluminum composition. The results were so gratifying that all of this manufacturer's ovens were ordered to be silicone treated. The oven coated in 1952 has been in constant use and has not required recoating up to this date.

ELECTRICAL PROPERTIES OF SILICONE COATINGS

Silicone coatings have high dielectric strengths. They are also fungistatic when properly cured and may be made fungicidal by proper treatment. Their use for insulating and fungus resistant varnishes where high operating temperatures cause the deterioration of conventional vehicles is thus indicated.

Silicone based coating systems for wire-wound resistors have good dielectric strengths and water resistance and are finding increased usage in this field. Such resistors fall between cement-coated resistors and ceramic-coated resistors in price and may be safely operated at temperatures up to 550F. Some ceramic-coated resistors are given an additional top coat of silicone enamel to improve humidity and salt spray resistance. All-silicone coated resistors are becoming an increasingly important factor in this field.

From the foregoing, it is apparent that silicone based finishes would find increasing uses in this modern age. In addition to their high temperature and dielectric properties, it should be remembered that silicone coatings also have excellent properties at temperatures as low as minus 50C.

COATINGS FOR AIRCRAFT AND MISSILES

The performance properties of a few silicone coatings required for various governmental end uses may be of interest. These and similar coatings have useful aircraft and missile applications.

TABLE XVI

BLACK SILICONE COATING

Film Thickness	0.0009–0.0015 in.
Heat Resistance	1000F for 15 min. Cool to 800F. 800F for 30 min. Cool to room temperature.
Thermal Shock Resistance	Heat to 800F for 15 min. Immerse in 50–70F water.
Water Resistance	24 hr in 100F water.
Salt spray Resistance	48 hr
Gasoline and Oil (SAE 30 motor oil) Resistance	2 hr
Flexibility	Bend over 0.75 in. mandrel.
Impact Resistance	500 gr weight dropped from height of 16 in.

TABLE XVII

ALUMINUM SILICONE COATING

Film Thickness	0.00075–0.0010 in.
Heat Resistance	24 hr @ 1000F
Hydrocarbon Resistance	4 hr @ 25C
Water Resistance	24 hr @ 25C
Salt Spray Resistance	24 hr
Weathering	300 hr accelerated weathering and 6 mo. @ 45° south in latitude of Washington, D. C.

Another aluminum silicone must withstand cycling from 400 to 1200F. Cycles alternate between 8 and 16 hr and the temperature increment is 100F with each cycle. After the 900F cycle, the coating must also withstand salt spray for 24 hr.

Compositions of epoxy resins modified with other polymers will yield organic coatings of excellent corrosion and abrasion resistance. One such coating for aircraft engines will successfully pass the following requirements:

TABLE XVIII

CLEAR EPOXIDE PHENOLIC

Corrosion Resistance	500 hr salt spray per ASTM B117-49T
Heat Resistance	48 hr @ 400F
Humidity Resistance	98–100 per cent RH at 120F for 500 hr
Impact Resistance	6 ft lb using 1.5 in. diameter steel ball
Fuel (ASTM Reference Fuel B) Resistance	24 hr
Oil (ASTM Oil No. 1) Resistance	24 hr @ 250F
Flexibility	90° angle bend at 80 ± 10F using Conical Mandrel Test Apparatus as described in ASTM D522-41

COATINGS FOR MAGNESIUM

Magnesium alloys are becoming more and more important for aircraft and related uses because of their weight-strength relationship. Recent work in our laboratories has revealed that air drying systems for this substrate (properly treated) which would maintain film integrity when subjected to a cyclic high humidity (100 per cent RH @ 100F) and high temperature (500F) test could be made from:

A. An epoxy-polyamide primer-enamel system. (This is a multi-package system.)

B. A tetrapolymer silicone primer-enamel system.

C. An epoxy-ester-silicone primer-enamel system.

In each case the primer contains a chromate ion inhibiting pigment and the top coat is an aluminum pigmented product. Although the epoxy-polyamide system is more troublesome to handle because of its limited pot life and although it discolors noticeably after the 500F exposure, it had the best performance of hundreds of compositions studied, being particularly good in resistance to the cycling exposure mentioned above, general film properties and resistance to jet fuels and diester lubricants.

ABHERENT COATINGS

Among the ancillary coatings which are of interest to the scientists and engineers of this so-called missile age, a few abherent coatings are either being used or evaluated at this time:

(1) Refrigerator ice tray coatings.

(2) Ice-abherent coatings for aircraft and runways.

(3) Solder abherent coatings for printed circuit work in electronics.

(4) Zinc abherent coatings in specialized galvanizing operations.

VEHICLES OF THE FUTURE

Now what of the future? Certainly the water-based coatings which were introduced a few years ago and on which a number of chemical companies have done so much fine work are going to set a pattern for future requirements in industrial or product finishes, just as they have done in the "trade sales" finishes. Would it be possible to overcome one of the foremost weakness of silicone polymers, that of poor film properties when air dried, by polymerizing them to a high molecular weight and then emulsifying them? Would the films thus deposited then compare in properties with those of high-baked films from the present silicone-organic solvent systems?

How about radiation-curing of polymeric materials? Some recent work indicates that this type of curing can be achieved —even though at high cost! The properties of these radiation-cured films are just now being studied.

How about tailor-making organic film-forming molecules which, based on theoretical studies and scientific observations, would have a combination of desirable properties not now obtainable in any known material? This sort of basic approach led to the creation of the highly important epoxy resins only a decade or so ago.

And how about the inorganic polymers which have just been reported in very recent years? Do they have applicability in the coatings fields?

Perhaps as much as anything, what is needed is a much better understanding of the chemistry and physics of how and why organic coatings function as they do. This is an area in which scientists in all fields can be of invaluable assistance. All of the time and efforts of brilliant scientists, and their modern instruments, must not be restricted to formulation work alone! These scientists must devote time and effort to exploratory research so that they may discover how and why—and through what mechanisms!

Today, organic coatings research is a vibrant, complex and exciting field of study. With the host of new chemicals being manufactured and with new concepts being elucidated, newer and better organic coatings will play a prominent part in the jet and missile programs of our country, as well as in the furtherance of economical and industrial growth in non-military areas.

Milton A. Glaser was born in New York in 1912. He graduated with a degree in chemical engineering from Tufts University, Massachusetts, in 1934 and pursued graduate studies at the University of Chicago and North Western University.

Mr. Glaser was chief chemist and director of research for a large paint manufacturer until 1945. He joined Midland Industrial Finishes, Waukegan, Illinois, as technical director in 1945 and became vice president in 1949. He is a member of American Chemical Society, American Oil Chemists Society, Institute of Food Technologists, National Association of Corrosion Engineers, fellow, The American Institute of Chemists, ASTM, the Chicago Paint and Varnish Production Club (president 1945–46), Federation of Paint and Varnish Production Clubs (president 1956–57), Registered Professional Engineer, State of Illinois, vice president of the Paint Research Institute, delegate member, Organic Coatings Section, International Union of Pure and Applied Chemistry. He is listed in Who's Who in Engineering, Chemical Who's Who, Who's Who in the Midwest.

He received the Outstanding Service Award of the Chicago Paint and Varnish Production Club in 1957. Mr. Glaser is the author and coauthor of numerous papers on silicones, alkyds, vinyls, epoxys and other organic coatings.

Edward J. Bromstead was born in Manitoba, Canada, in 1912 and moved to the United States in 1923. He majored in chemistry at Marquette University and joined the technical staff of Midland Industrial Finishes in 1943. He is now senior group leader of the Midland Laboratories.

He is a member of Chicago Paint and Varnish Production Club, the board of directors of Waukegan YMCA. He has authored or coauthored papers on many phases of industrial coatings.

Section of the polishing shop showing two of the six polishing and grinding lathes.

Part of the 7000 bumper-bar inventory waiting to be processed.

PLATING A BUMPER CROP

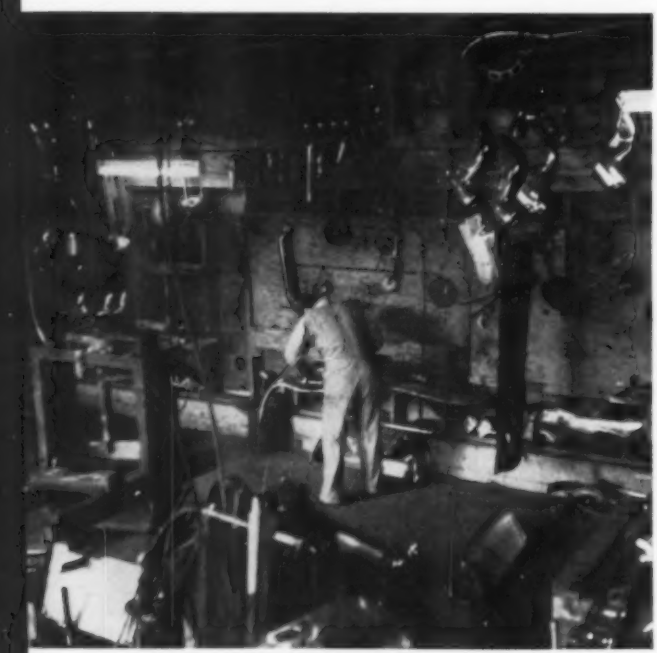
by JAMES H. LEE*

ALTHOUGH THE title might indicate a farm of chrome plants, nickel trees and rectifier stacks, what actually is located at Fairmont Plating Ltd. on Kingsway in Vancouver, B. C., is Canada's first automotive bumper exchange. Here a customer can either bring in—or have picked up—a damaged bumper, bumperette or overrider and receive immediately a similar component in return, without waiting the usual refinishing time. For garages operating on a tight schedule such a service is a great boon as their customers are not inconvenienced by loss of transport due to lack of local stocks.

Such a service also allows owner Bill Kilby to plan his work schedules well in advance and, when stocks run low, to obtain greater use of his equipment by fully occupied night shifts.

Over the past five years Mr. Kilby and his partner, George Caslor, together with a crew which has grown from three in 1956 to 23 today, have accumulated over 7000 bumpers, most of which fit American cars. However, recently bumpers for English and continental makes also have been added to their stock.

*Mackenzie and Feimann Limited, Vancouver 6, B. C., Canada.



Partial view of the repair shop where all repairs including pressing, welding and hand finishing are made.

STEP-BY-STEP PROCEDURE

The first step in processing an exchange bumper is to enter it in the catalog, this department is supervised by Mr. Caslor, whose father opened Vancouver's first electroplating shop in 1908. A rotating card index wheel has proved the most satisfactory method for keeping track of the substantial percentage of possible bumper combinations (front/back, make, model and year) which are dealt with annually.

After being cataloged the bumper is removed to a separate shop where hydraulic presses, welding torches, files and other body tools are used to shape the metal back to its original factory specifications.

Following this operation, the bumpers enter the refinishing department, where they are first chemically stripped and then polished, by set-up wheels only, down to a 200 grease finish. However, should extensive metal removal be needed, coarse belts on a back stand idler are used.

The cleaning cycle which follows the polishing consists of

Part of the "finished" section. Here bumpers await wrapping for delivery to customer or stock room.

a proprietary electro-cleaner, sulfuric acid dip and various rinses, after which the bumpers enter a cyanide copper strike preparatory to the acid copper build-up.

The copper is then buffed bright on diamond stitched buffs using Tripoli and again the surface is prepared for plating in the electro-cleaner, rinse and acid dip sequence.

Believe it or not, although unfinished, these bumpers are all recorded and can be processed at a moment's notice.

The copper coat then receives a good thickness of nickel in the high chloride bath*. After removal from the nickel tank the bumpers are rinsed, acid dipped, rinsed again and then receive final plate in the normal 53-oz chrome bath operated at a temperature of 110F. Following the plating cycle are the final steps of drying, wrapping in brown paper and entering the storage stacks.

Power requirements of the plant are taken care of by both MG sets and selenium rectifiers. A much overloaded 750-amp MG set powers the acid copper and electrocleaner, another similar 1500-amp set takes care of one bright nickel and cyanide strike whereas the other nickel is taken care of by a 1000-amp 6-v rectifier. A recently acquired 3000-amp 9-v rectifier gives ample power to the chrome tank.

SOLUTION CONTROL AND FILTRATION

Control of the solutions is carried out by regular analysis of the various metal and organic ion concentrations supplemented by daily additions of brightener, based on work inspection and volume of throughput. Filtration is continuous on the nickel tank but only once a month on the copper tank, which are run at temperatures of 130 and 120F respectively.

At the present time two one-half-ton pickup trucks take care of deliveries in the Greater Vancouver area, but increasing demand will soon necessitate the addition of another vehicle. Future plans also call for a doubling of floor space from 5000 to 10,000 square feet in new premises better located in a lower tax area. With its own delivery system, the firm will not be so dependent upon a central location.

The success of the business is now apparent, for recently another plant has set-up locally and enquiries have been received by Mr. Kilby from the entire breadth of Canada for information regarding his system.

*Udylite high chloride bath converted from Udylite UBN 31 Solution.

James H. Lee was born in Yorkshire, England, and became a Canadian at an early age. In Canada, he started his business career as a clerk in a paper firm, moving from there to a sales position with Mackenzie and Feimann Limited, Vancouver. In addition to contacting electroplaters, Jim Lee supplies chemicals to the mining and agricultural industries in British Columbia. In 1956, together with Bill Marquardt of Hudson Plating, he generated sufficient interest in the AES to enable the formation of the British Columbia Branch with 17 charter members. The Branch now has 35 members and conducts a complete electroplating night school. Jim Lee became Branch president in 1958, after serving as secretary for the first 18 months of the Branch's existence.

MOSCOW CONFERENCE ON CORROSION AND PROTECTION OF METALS

Special Report

by ABNER BRENNER

Chemistry Division
National Bureau of Standards
Washington, D. C.

LAST SPRING I attended the All Union Scientific-Technical Conference on Corrosion and Protection of Metals, which was held in Moscow from May 19 to 24. It was held under the auspices of the USSR Council of Scientific and Engineering Societies. I shall discuss here only that part of the Conference of interest to electrodepositors.

The Conference consisted of six different divisions which met separately. One of these dealt with electrodeposition and related subjects. It was quite a coincidence that at the very time that a platers' convention was in progress in the USA, there should also be one in the USSR! At the electrodeposition Conference 40 papers were delivered in the course of several days.

The meetings were attended by both scientists and plant personnel and apparently some rivalry existed between the two groups. After one scientist had finished speaking about the development of a new metal cleaning process, a woman—apparently a worker from a plant—arose to make comment. She was short of stature but long on oratory. She made a fiery speech demanding to know why the scientists always gave them processes that didn't work; had this process been thoroughly tried out? Where were the materials to be obtained and how much did they cost? Was the process economically sound? She received heavy applause when she finished, so that apparently she represented the feelings of many in the audience.

The main subjects covered in the electrodeposition sessions were: cleaning of metals, with some emphasis on the use of ultrasonics; phosphate coatings; electrodeposition of chromium from self-regulated baths; electrodeposition of nickel-phosphorus and nickel-iron alloys; zinc plating; electroless nickel plating; anodizing, and instrumentation.

In conjunction with the meeting there was an electroplating exhibit. Among the items or processes displayed were: chromium deposits from a self-regulating bath; deposits of a bright nickel-zinc alloy; phosphate coatings; surgical instruments coated with electroless nickel; displays showing the effects of acid inhibitors; samples of dyed anodized aluminum; plating barrels; buffing supplies; and thickness gages.

The composition and operating conditions of the self-regulating chromium bath as given at the exhibit were: strontium sulfate, 6 g/l; potassium fluosilicate, 20 g/l; chromic acid, 250 g/l; temperature 50 to 65C; current density 20 to 100 amp/dm². The cathode current efficiency was 17 to 21 per cent.

The composition of the bath for depositing a bright nickel-zinc alloy which contained 2 per cent of nickel was:

Zinc, 32 g/l added as $Na_2Zn(CN)_4$
Nickel, 0.75 g/l added as $Na_2Ni(CN)_4$
NaCN, total, 100 g/l
NaOH, total, 68 g/l

Samples of zinc plating from an ammonium bath were exhibited. The bath had the following composition: NH_4Cl, 240 g/l; ZnO, 12 to 15 g/l; boric acid, 20 to 25 g/l; colloid addition agent 1 to 2 g/l. Temperature of operation 30 to 35C. Current density, 0.5 to 1.0 amp/dm². Phosphating of zinc coatings was recommended.

The USSR has no society equivalent to the American Electroplaters' Society and publications dealing with electrodeposition appear in various scientific journals.

Of particular interest to me was my acquaintance with Dr. A. T. Vagramyan, who is the chief of the electrodeposition section of the Institute of Physical Chemistry. His position with the Russian Government is almost the exact counterpart of mine in the National Bureau of Standards. He has a vigorous and capable group of about 20 to 30 people engaged on high level research. I was pleased to meet some of those workers whose papers I had read previously, particularly Dr. Gorbunova, who had done work on electroless plating and whose recent publications on the theory of alloy deposition were of especial interest to me. I was surprised to find that Dr. Gorbunova and perhaps half of the scientists that I met were women. This may be a reflection of the great loss of manpower that Russia suffered in World War II.

The researches being carried on in Dr. Vagramyan's laboratory were of considerable interest. Emphasis was being put on the physical properties of electrodeposits, a subject that is somewhat neglected in this country. The magnetic properties of electrodeposits were determined with an instrument that yielded an instantaneous graph of the hysteresis loop on an oscillograph. The deposit was simply plated on a small rod and inserted into the instrument. An investigation of the hydrogen content of electrodeposited coatings was under way, and the laboratory had its own vacuum fusion apparatus for analysis. The effect of superimposed ac and dc on the crystal structure of deposits, particularly of nickel, and the effect of the frequency of the ac on the adsorption of sulfur were being studied. The sulfur was determined by using the radioactive element. Other subjects can only be mentioned because time was not sufficient for me to learn the details.

(Continued on page 1074)

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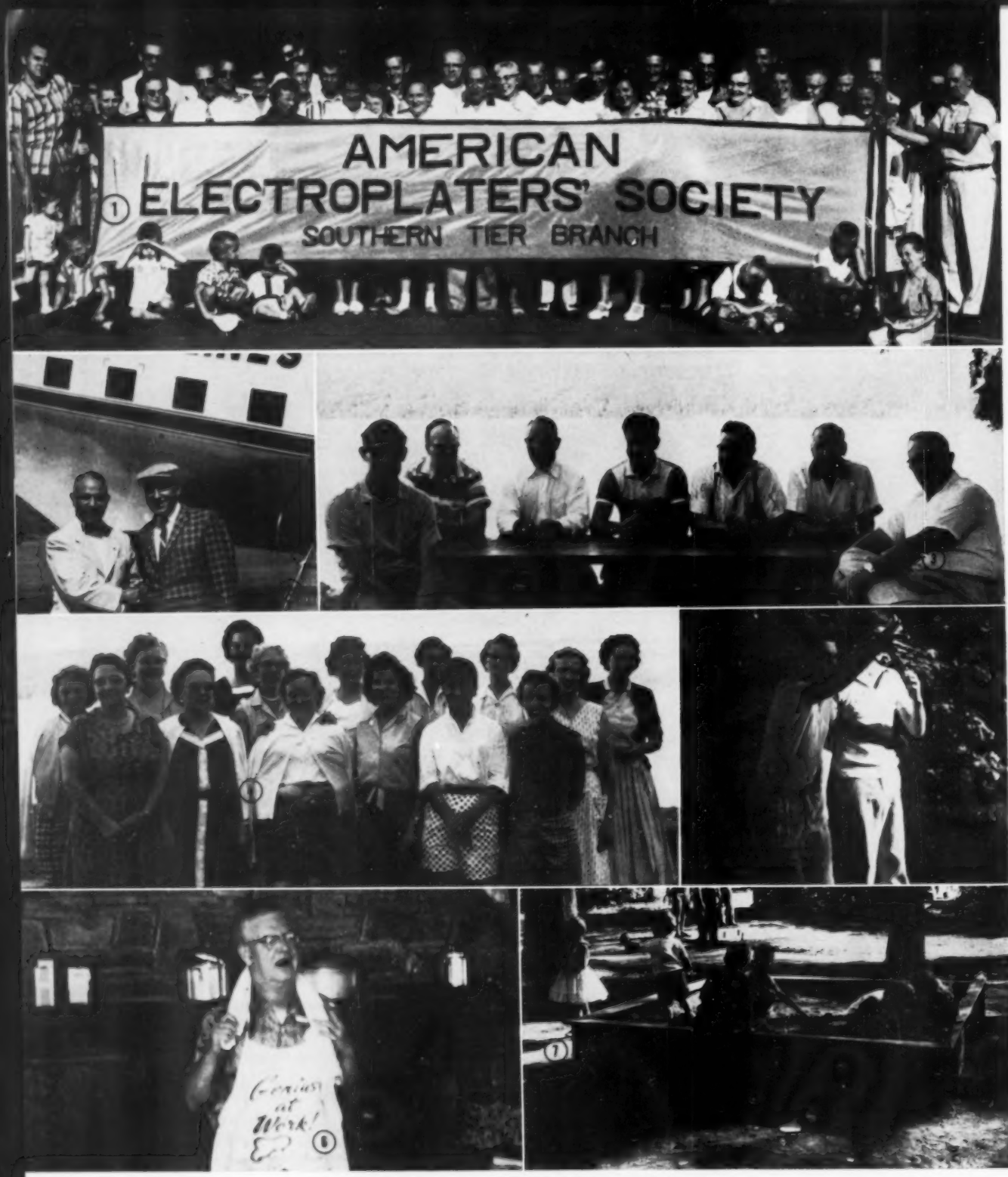


SOUTHERN TIER FROLICS BY CAYUGA'S WATERS

(1) Aligned proudly behind its Golden Jubilee flag, a part of the Southern Tier Branch, including (direct center) Branch President-elect and Mrs. Morgan D. Rake; Chairman and Mrs. John J. Bunsic, Charles Bound, John P. Nichols and Branch President and Mrs. Stanley Stefanski. (2) General Chairman John J. Bunsic welcomes Executive Secretary John P. Nichols upon arrival in Ithaca, N.Y. (3) Left to right, Branch Librarian Charles Emery; Vice President-elect Charles Harris; John P. Nichols; Branch President Stanley Stefanski; Treasurer Willis Wood; Chairman John J. Bunsic and Branch President-elect Morgan D. Rake. Beautiful Lake Cayuga in background. (4) A few of the ladies of the Branch who did so much to make the happy Golden Jubilee event so successful. (5) Vying for Southern Tier's horseshoe pitching championship. (6) Austin Fletcher of Enthone, head chef, calls "Come and get it." (7) Southern Tier's children also had their day.

AES NEWS

SOUTHERN TIER CONDUCTS STANDOUT GOLDEN JUBILEE BRANCH OUTING

Fully-attended by Branch members and their families, including a number of guests from other Upstate New York Branches, the Midsummer GOLDEN JUBILEE Outing of the Southern Tier Branch at fabulous Taughannock Falls State Park on the shores of Lake Cuyuga near Ithaca, New York., August 23, 1958 was a standout success. There were excellent and plentiful food and refreshments, games for young and old, prizes galore, plus a twilight cruiser ride on Lake Cuyuga through the courtesy of W. A. Braithwaite.

In Ithaca and for miles elsewhere, every thoroughfare leading to the vast State Park was marked with AES signs leading to the GOLDEN JUBILEE outing. The Supreme Society was represented by National Executive Secretary John P. Nichols. A feature of the outing was the twenty-foot GOLDEN JUBILEE flag of the Southern Tier Branch made and presented by Outing General Chairman John J. Bunsic who is also the Branch's Public Relations Chairman.

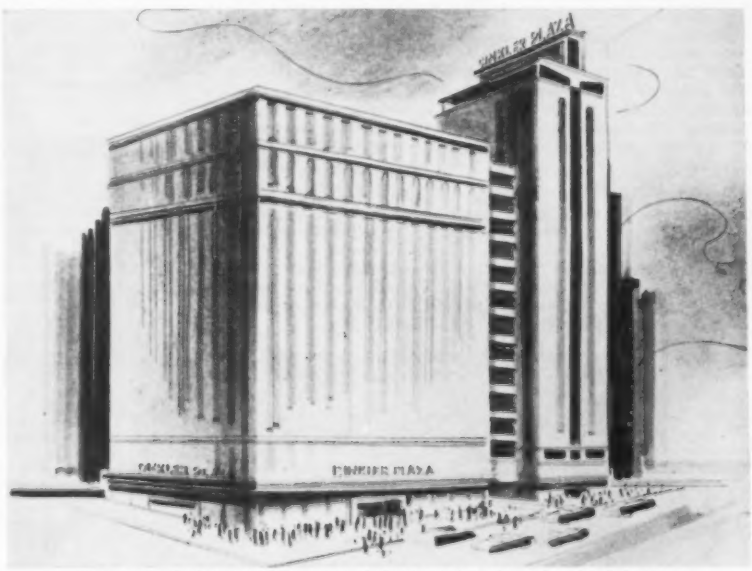
Aside from Chairman Bunsic, the industrious Committee was composed of Branch President Stanley Stefanski, C. Emery, J. McCarthy, A. Fletcher and R. Wheeler. Also Branch President-Elect Morgan Rake, S. Botting, L. Rood; C. Harris, G. Zurenda and Charles Bounds. Much of the event's success was due to the effective cooperation of the ladies of the Branch.

DUE DATES FROM AES BRANCHES

OCTOBER 15	Return Sheets from accredited Delegates covering Branch Nominations for AES Scientific Achievement Award.
NOVEMBER 3	Return Sheets signed by both the Branch President and Branch Secretary designating and certifying the Branch's duly elected Delegates and Alternates for Credentials Committee accreditation. The tenure of these Delegates will be from the first Branch Meeting following the 1958 Cincinnati Convention to the first Branch Meeting following the 1959 Detroit Convention.
DECEMBER 1 (September if possible)	Per Capita Taxes for all Branch Members in good standing covering the 15-month period from April 1, 1958 through June 30, 1959.

AES'S PINNER CITED BY OHIO COMMISSION

For valued service in the organized crusade of the Ohio River Valley Water Sanitation Commission against stream pollution through intelligently established waste control procedures and facilities, that Commission recently awarded a Certificate of Appreciation to AES Past President Walter L. Pinner at a ceremony of presentation held in Columbus, Ohio. The certificate was presented to Mr. Pinner by Dr. Ralph Dwark, Director of the Ohio State Health Department and a member of the Commission.
Mr. Pinner, representing AES, served as first Chairman of the Commission's Metal Finishing Industry Committee. He was succeeded as such by Robert Chollar of the National Cash Register Company who, in turn, was followed by L. J. Hibbert of the same company. Receiving the Certificates from Dr. Dwark are Mr. Pinner, left, and Mr. Hibbert, center.



DIXIE TWO-DAY MEETING LOOMS AS GOLDEN JUBILEE HIT

Above, the Dinkler-Plaza Hotel, Atlanta, locale of the AES's "Dixie Golden Jubilee Regional Educational Sessions and Supreme Society Sixth Interim Meeting" to be held February 13–14, 1959. A major FIFTIETH ANNIVERSARY regional event, the two-day Dixie feature will include a plant tour, two educational sessions, the annual mid-winter all-day meeting of the Supreme Society and, finally, a gala "Golden Jubilee" reception and banquet. Sponsored by the Dixie Region composed of the AES's Blue Ridge, Miami and Southeastern Branches, the burgeoning Atlanta affair is being hosted by the latter Branch. Myron M. Randman of Southeastern is General Chairman, with Past National President Frederick Fulforth serving as Sixth Interim Meeting Coordinator. The Executive Board will meet before and after the Interim Meeting.

MILESTONES OF AES

A PLATING MAGAZINE original feature during this observance fiscal year of the FIFTIETH ANNIVERSARY of its parent, American Electroplaters' Society, Inc.

THE NATIONAL Electro-Platers Association of the United States and Canada (NEPA), organized on April 10, 1909 and incorporated as a New York non-profit membership corporation on October 18, 1909, provided a cooperative structure to the progressive foremen platers of that era for the enhancement of technical and scientific knowledge and advancement of electroplating, metal finishing and allied arts.

Needing a medium of its own through which to enrich the technical knowledge of its swelling membership, NEPA inaugurated a quarterly magazine in June 1910 titled QUARTERLY REVIEW with August G. Hoffmann of Jersey City as Editor. A 6" x 9" paperbound 28-page booklet at start, that trailblazing issue, granddaddy of today's PLATING MAGAZINE, was launched with such technical articles as: "The Art of Decorating Metals with Pigments and the Production of Antiques" (Charles H. Proctor); "The Care of Lacquers" (W. A. Jones); "The Production of Matt Gold Finish" (Royal F. Clark); "The Electrical Side of Electroplating" (William Voss); "Water Dip Lacquers and Their Use" (C. De Braun); "Roman Color on Gold Jewelry" (Charles A. Stiehle); "The Rose Gold Finish" (J. S. Stremel) and "The Green Gold Finishes" (August G. Hoffmann).

ON June 1, 1913, NEPA became today's American Electroplaters' Society (AES), and the "June-July-August" 1913 issue of QUARTERLY REVIEW was the magazine's first under the aegis of AES. Grown to 48 pages and edited by Samuel R. Taylor, with the National President and all Branch Presidents as Associate Editors, it now featured broader technical editorial scope with three articles on copper and brass plating; one on cleaning stove parts; one on acid zinc plating and several general articles.

Growing AES membership and the Society's driving ambition to further technical knowledge resulted in the broadening of the frequency and usefulness of AES's official journal in June 1914. In that same month that Austria declared war on Serbia thereby launching World War I, AES's MONTHLY REVIEW made its first appearance as successor of QUARTERLY REVIEW and immediate forerunner of PLATING MAGAZINE of today.

Still a 6" x 9" paperbound booklet but now enlarged as to pages, that pioneer issue was edited by H. E. Willmore of Chicago. Its Associate Editors were NEPA Founder Charles H. Proctor; Past President George B. Hogaboom; National President J. H. Hansjosten; Chicago Branch President Oscar E. Servis, and AES members Harry de Joannis (Bridgeport Branch), Fred J. Liscomb (Chicago Branch) and Ernest Lamoureux (Chicago Branch).

IN THE NEXT third-of-a-century, MONTHLY REVIEW kept pace with AES's structural, functional and educational progress. From a humble, quarterly Society journal, it developed, step-by-step, into a modern competitively top flight 6" x 9" monthly magazine still fully owned by, and still fully tailored for, the members of American Electroplaters' Society, Inc.

Its first pictorial illustration, a half-tone group photograph of the AES's Tenth Annual Convention held in Cincinnati, was published in 1922.

In September 1933—in the nadir of our nation's most drastic economic depression—MONTHLY REVIEW appeared for the first time with product advertising. Editorially, the transition was proclaimed thus: "There seems to be a change taking place all around us. In our industrial life, we are faced with changes that would have seemed impossible a few months ago. The plating business must keep up with the new order of things. We have, in the September issue, taken a step forward which should help us financially . . . Let us broaden our vision and include in our membership all who make plating their means of livelihood . . . Our task is to bring these various groups under one head . . ."

MONTHLY REVIEW's advertisers in that historically significant issue, and therefore AES's first advertisers, were MacDermid, Inc. of Waterbury, Conn. (full page); United Chromium, Inc. of New York (The Metal & Thermit Corp. of today) full page; Frederic B. Stevens, Inc. of Detroit, Michigan (full page) and the American Brass Co. (Anaconda Copper); The Matchless Metal Polish Co. of Chicago and the E. Wambaugh Co. of Goshen, Indiana.

In its October 1933 issue, MONTHLY REVIEW, moreover, introduced classified advertising to AES at 10c per line, 6 words to the line. In that same issue, it carried the product advertising, for the first time, of the Crown Rheostat & Supply Co. (Chicago); The Abbott Ball Co. (Hartford); Maas & Waldstein Co. (Newark); Ault & Wiborg; The Zapon Co. (North Chicago) and the H. V. Walker Co. (Elizabeth, New Jersey).

Proudly, MONTHLY REVIEW welcomed these additional product advertisers to its advertising columns, for the first time, in these years through the Nineteen Thirties:

1934

Kocour Company
Harshaw Chemical Co.
Charles F. L'Hommedieu & Sons Co.
The Zialite Corp.
Sulphur Products Co.
McKeon's Liquid Sulphur

1935

Magnus Chemical Co.
Bruce Products Corp.
Oakite Products, Inc.
MacFarland Mfg. Co.
Egyptian Lacquer Mfg. Co.
Pyrene Manufacturing Co.
The Udylite Corporation

1936

Frederick Gumm Chemical Co.
Stanley Chemical Co.
Lowell Research Laboratories
Rumford Chemical Works
Bias Buff & Wheel Co.
Magnuson Products Co.
The Grasselli Chemical Co.
Detroit Rex Products Co.
T. J. Murray Co.
Harrison & Company

1937

Lasalco Inc.
Storts Welding Co.
Michigan Buff Co.
McAleer Manufacturing Co.
J. J. Siefen Co.
Belke Manufacturing Co.
Norton Abrasives Co.
Divine Brothers Co.
Hammond Machinery & Builders Co.
E. Reed Burns Mfg. Co.
The Meaker Co.

1938

E. I. duPont de Nemours & Co.
Platers Research Co.
Alrose Chemical Co.
Industrial Filter & Pump Co.
McGean Chemical Company
Paul Frank

1939

Heil & Co.
J. B. Ford Co. (Wyandotte Chemical Corp.)
Hanson-Van Winkle-Munning Co.
The Lea Manufacturing Co.
Merck & Co. Inc.
Jackson Buff Corporation
George A. Stutz Mfg. Co.
Buckingham Products Company

The very first employment of color within MONTHLY REVIEW occurred in its December 1937 issue. In that edition, the Bruce Products Corporation of Detroit mounted orange in its two-page advertisement. First consistent color user, however, was the Hanson-Van Winkle-Munning Co. whose first color spread in the September 1939 issue introduced a practice of harnessing color to its MONTHLY REVIEW advertising that the company followed constantly through the years of MONTHLY REVIEW's life.

MILESTONES OF AES

IN THE earliest Forties, more and more industrial advertisers entered the family of MONTHLY REVIEW's product advertising patrons—most of which have ever since consistently patronized that publication and PLATING MAGAZINE, its direct descendent, to AES's great pride in their continued and continuing confidence.

By 1947, growing AES, composed already of some 5000 members in all classifications residing globally had reached another major milepost in its history, namely need for metamorphosis and expansion of its monthly magazine so as to enable AES to meet the broader vista of its destiny ahead.

From AES's then National Headquarters at Jenkintown, Pennsylvania, came this announcement in the November 1947 issue from Gustaf Soderberg, MONTHLY REVIEW's able then-Editor:

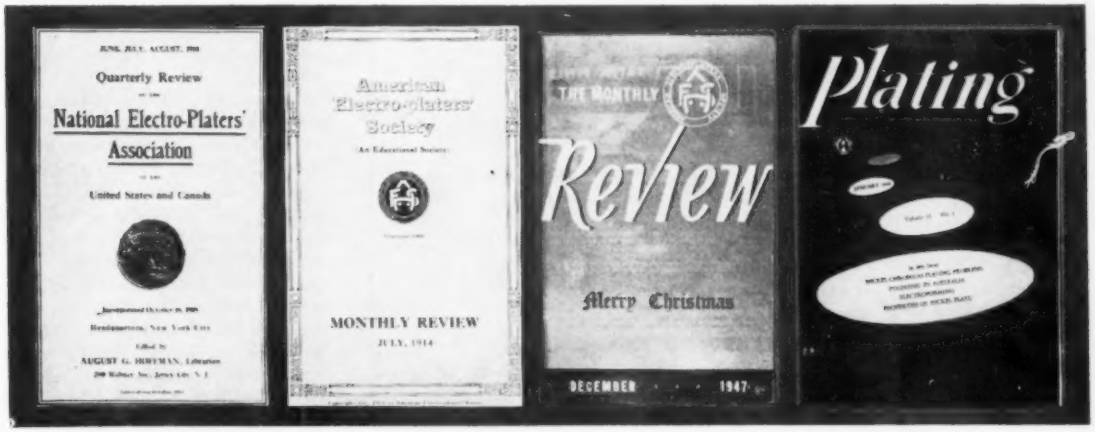
> New name . . . new size . . . new features will distinguish MONTHLY REVIEW beginning with the New Year.
>
> Of a new name, some of our friends may say, "Why change?" and cite the Bard's oft quoted words, "What's in a name? That which we call a rose by any other name would smell as sweet" . . . and we would bow and say, "Thank you, kind sir, for mentioning the rose." But even Shakespeare would rebel, were the rose called "The State Flower of New York, North Dakota and Iowa." THE MONTHLY REVIEW of the American Electroplaters' Society frankly is such a name, . . . not very descriptive and certainly long and clumsy.
>
> The name of PLATING was chosen by the Executive Board of the Society by means of a "New Name Contest" (August issue) conducted among the members. It was chosen from 132 entries and was proposed by Robert E. Moore, 51 Forest Hill Road, West Orange, N. J., a member of the Newark Branch and recipient of the $50.00 prize for his winning entry.
>
> The new size will be 8¼ x 11¼ inch trim and 7 x 10 inch type area. This size has two advantages. First: to our readers, permitting better treatment of editorial matter, photographs, drawings, charts, graphs, etc. the use of larger, more readable type, and the inclusion of more technical articles. Second: to our advertisers, because it provides more space per unit for their selling message and, at the same time, saves them hundreds of dollars yearly by eliminating the necessity of special size plates. This new size, incidentally, is that which was standardized several years ago by the National Industrial Advertisers' Association as the most practical and has since been adopted by the leading industrial and technical publications.
>
> The tremendous growth of the AES in size and influence, a growth due to the never-ending search by its members for more comprehensive knowledge and a better understanding of the very complicated art of plating, is evidenced in the growth of this magazine, its official organ.
>
> We feel that these changes . . . our turning over a new and larger leaf . . . reflect this expansion and will be an inspiration for even greater effort.

In its December 1947 issue, Editor Soderberg penned this MONTHLY REVIEW obituary:

> This is literally and actually the last page of THE MONTHLY REVIEW. As was announced in last month's editorial columns, the January 1948 issue of this publication will bear the title of PLATING. PLATING will be larger in page size than THE MONTHLY REVIEW and will be distinctively styled with a new format. It will be easier to read, too, because it will have larger type in the text matter.
>
> The decision to enlarge the size of the publication was made several years ago, but the war, with its corresponding paper shortage, prevented carrying out the plan. January 1948 offered the first practical opportunity for this change.
>
> Active planning for the new publication has been under way for over a year. There have been an untold number of staff conferences. Outside authorities in the plating and publishing fields have contributed generously with good advice. All who have seen the advance "lay-out" of the new format have spoken enthusiastically of it.
>
> We feel confident that our readers will receive the "new look" of PLATING with enthusiasm. The same high quality, factual editorial content that has characterized THE REVIEW will form the basis of PLATING. Interesting and useful new features will be added in coming months. And in the same manner that an electroplater adds a pleasing appearance to a finished product, we are attempting to make our "editorial package" as attractive as possible.

In December 1947, consequently, AES published its last issue of MONTHLY REVIEW—in January 1948, today's PLATING MAGAZINE made its debut.

—JOHN P. NICHOLS



SPECIAL 1958-1959 FUNCTIONAL COMMITTEES APPOINTED TO SERVE SOCIETY

In behalf of the Executive Board, National President Herberth E. Head recently announced appointment of a number of special AES Committees formed for specifically functional purpose, some by direction of the May 22, 1958 Annual Meeting of the Supreme Society, the Society's highest governing council. These, with one-year tenures ending at the Supreme Society's meeting in Detroit, June 18, 1959 are additional to the already manned AES's standing Boards and Committees respectively specified by the Society's Bylaws, including the Editorial Board and the AES Scientific Achievement Award, Educational, Law, Membership, Publications, Public Relations and Research Committees.

To the six-man committee to study the need for a Convention Planning Committee as ordered by the Supreme Society following favorable consideration of a motion to this effect by the Baltimore-Washington Branch, President Head, for example, appointed six former Annual Convention General Chairmen, namely G. Ross Davidson (Montreal 1957); Dr. Samuel Heiman (Philadelphia 1953); Arthur G. Pierdon (Washington 1956); George Schore (New York 1954); Charles Wise (Cincinnati 1958) and Wright W. Wilson (Detroit 1959). Mr. Wilson heads that Committee.

For the sole purpose of studying the need for an AES Planning Committee and, if found to be needed, of suggesting the duties of such a committee, Mr. Head has appointed a Committee, in behalf of the Board, as ordered by the Supreme Society. Ezra A. Blount; Ellsworth T. Candee; Cleveland F. Nixon; Fielding G. Ogborn and Ralph E. Schaefer were appointed to that Committee whose function is to appraise that need.

Otto Bert Kirchoff of the Buffalo Branch has been appointed to the 1958–1959 Paper Awards Committee thereby rounding out that Committee's membership. Frank O. Beuckman of the Rochester Branch is Chairman and R. Scott Modjeska of the Chicago Branch is the other member of that Committee whose charged responsibility is the selection of the Society's 1958–1959 Paper Award Winners.

At its Cincinnati Meeting, the Supreme Society adopted the report of a Committee headed by Rudolph Hazucha of the Chicago Branch establishing standards for the selection of AES Honorary Members and Award of Merit winners. By order of the Supreme Society, the Bylaw amendment to this effect (initially sponsored by the Baltimore-Washington Branch) was referred to the Law Committee for language and other adaptation to the AES's Bylaws. Now in the hands of the 1958–1959 Law Committee for that purpose, the amendment, including its provisions for the appointment of a functional Committee, will be harnessed by the Executive Board as promptly as possible after the Law Committee completes its work.

The AES's 1958–1959 Liaison Representatives with other technical and scientific Associations and Society's, as appointed by President Head, are listed in an adjoining column.

AES LIAISON WITH OTHER SOCIETIES

1. American Society for Testing Materials (ASTM)
   - John P. Nichols, American Electroplaters' Society
   - ASTM Committee A-5, Corrosion of Iron and Steel
   - August Mendizza, Bell Telephone Laboratories
   - ASTM Committee B-8, Electrodeposited Metallic Coatings
   - Donald M. Bigge, Chrysler Corporation
   - ASTM Committee D-19, Industrial Water
   - George E. Best, Allied Chemical Corp.
   - ASTM Committee B-7, Sub-Committee VI on the Anodic Oxidation of Aluminum and Magnesium Alloys
   - R. F. Hafer, Reynolds Metal Company
2. American Standards Association (ASA) Committee Z-74 Performance of Effluent Air and Gas Cleaning Equipment
   - George Schore, Brucar Equipment & Supply Co.
   - ASA Committee Z-9, Sectional Committee on Safety Codes for Exhaust Systems
   - W. R. Fidelius, Hanson-Van Winkle-Munning Co.
3. International Council for Electrodeposition and Metal Finishing
   - Dr. Walter R. Meyer, Enthone, Inc.
   - Walter L. Pinner, Houdaille Industries, Inc.
4. Inter-Society Corrosion Committee
   - George E. Best, Allied Chemical Corp.
5. Metal Finishing Suppliers Association
   - R. F. Ledford, Chemray Corp.
6. National Association of Corrosion Engineers
   - George E. Best, Allied Chemical Corp.
7. National Association of Metal Finishers
   - Arthur G. Pierdon, Art Metal Finishing Co.
8. National Technical Task Committee on Industrial Wastes
   - Dr. D. Gardner Foulke, Hanson-Van Winkle-Munning Co.
9. Ohio River Valley Sanitation Commission
   - William J. Neill, Columbus Metal Products, Inc.
10. Society for Plastic Engineers
    - Arthur W. Logozzo, Nutmeg Chrome Co.

PHILADELPHIA LAUNCHES AES's BRANCH GOLDEN JUBILEE EVENT SEASON

The coming Philadelphia Branch's Annual Educational Session and Banquet will be the Branch "GOLDEN JUBILEE" affair that will launch the AES's FIFTIETH ANNIVERSARY season of such Branch events.

Philadelphia, second oldest AES Branch, will conduct its two-day meeting on Friday, October 31 and Saturday, November 1 at the Hotel Sheraton in the Quaker City. The sessions will be concluded and highlighted by a GOLDEN JUBILEE Banquet. Dancing and entertainment are included in the evening's program. Tickets are $7.50 per person.

Founded in 1910, the experienced Philadelphia Branch, which will observe its own half-century celebration in 1960, has already hosted three AES National Conventions (1919, 1932 and 1953) and has produced a number of National Presidents. The AES's first Interim Meeting was held in that City of Brotherly Love in 1951.

The Friday Educational Session will start at 7:45 p.m. with a Walt Disney cartoon film on Basic Electricity. Irvin K. Hauseman, technical chairman, has announced two speakers. "Pilot Cell Using Standardized Bent Cathode for Plating Test Control" will be presented by John B. Wilder, president of Incar, Inc. James F. Zievers, vice president, Industrial Filter and Pump Manufacturing Co., will speak on "Filtration."

Hotel Statler-Hilton, Detroit, AES 1959 Convention Headquarters

DETROIT BRANCH PROVIDING SEASONED GOLDEN JUBILEE CONVENTION/EXPOSITION STAGING

THE FIFTIETH ANNIVERSARY observance of the American Electroplaters' Society (AES) that made its debut July 1, 1958 is gaining momentum as time-tabled.

Aside from National Headquarters, PLATING and the Research Program, for example, many AES Branches are using Golden Jubilee letterheads, notably Chicago, Detroit, Milwaukee, Philadelphia, Southeastern, Hartford, Southern Tier and others, with more Branches due soon to start. Other Anniversary media are shortly scheduled for planned dissemination, and Branches and Regional groups, coast-to-coast, are at work on creating Golden Jubilee events expected to have important impact.

Cumulatively, these and many other national and local Anniversary features, including PLATING MAGAZINE's Golden Jubilee Issue, are targeted toward AES's FIFTIETH ANNIVERSARY climax, namely its Golden Jubilee Convention and Industrial Finishing Exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing, that the AES will conduct in Detroit, Michigan, June 15–19, 1959, with its Detroit Branch as Host. These are expected to attract the largest international participation and audience in AES's half-century lifetime. An Anniversary feature of AES's Fifth Industrial Finishing Exposition will be the GOLDEN JUBILEE LOUNGE of the AES and of its PLATING MAGAZINE and Research Program.

BRANCH IS VETERAN OF FOUR PRIOR AES NATIONAL CONVENTIONS

The Detroit Branch is well-qualified to host an AES Anniversary enterprise of such stature and significance.

Founded in 1912 as a chartered Branch of the National Electro-Platers Association of the United States and Canada (NEPA) that became today's AES in 1913, the Detroit Branch was among the Society's first seven Branches to be created. In 1959, it will be observing its own 47th birthday.

With an active membership of some 800, Detroit is AES's largest Branch at this writing.

During its lifetime, it has already hosted four successful Annual Conventions, (1918, 1929, 1934 and 1947) thus matching the Cleveland Branch in this connection. The Golden Jubilee Convention in 1959 will be its fifth Annual Convention sponsored thereby giving it leadership in number of AES national assemblies staged.

In 1947, moreover, it conducted AES's First Industrial Finishing Exposition consequently earning it the distinction of pioneering such national AES exhibitions.

Of National Presidents who have graced AES's helm to date, the Detroit Branch boasts six, namely A. B. Wilson (1937–1938), W. M. Phillips (1938–1939), C. C. Conley (1942–1943), Walter L. Pinner (1945–1946), Cleveland F. Nixon (1951-1952) and Herberth E. Head (1958–1959).

QUALIFIED PERSONNEL CREATING VERSATILE ANNIVERSARY CONVENTION/EXPOSITION

For the success of this mammoth Anniversary venture, the Detroit Branch has vested responsibility in a star-studded Branch Committee led, as General Chairman, by Wright W. Wilson, a leadership veteran of numerous national and Branch functions.

The balance of the Committee is composed of these functional Chairmen: Howard J. McAleer (Exposition), Walter L. Pinner (Educational Sessions), Donald M. Bigge (Banquet), Donald C. Austin (Registration), Robert H. Dudley (Outing), James E. Fritts (Plant Visitation), William P. Katke Jr., (Hotel Contact), Mrs. George A. Pillsbury (Ladies), Wilson J. McCormick and H. E. Nice (Hotel Housing), John F. Siefen (Finance), Charles L. Southwick (Transportation), Robert C. Trees (Publicity, Program and Printing) and A. J. Turner (Entertainment). E. J. Kubis is the Committee's Secretary.

Manuel E. Ben (General Motors Corp.) is the Detroit Branch's current President. Donald M. Bigge (Chrysler Corp.) is First Vice President, Fred E. Olmstead (Studebaker-Packard Corp.) is Second Vice President and Edward J. Kubis (Wyandotte Chemical Corporation) is Secretary-Treasurer. Its Board of Managers consists of Guy Cummings Jr.; John F. Siefen and James D. Thomas.

Accredited Detroit Branch Delegates serving on the Supreme Society, AES's governing council, are National President Head, Branch President Ben and AES Past President Nixon. Past President Pinner, Leland M. Morse and Joseph Gurski are the Branch's Alternate Delegates.

Detroit's Sheraton-Cadillac will house many convention–exposition attendants.

INTERSOCIETY NEWS

WESTERN METAL EXPOSITION PLANNED FOR LOS ANGELES

Again the Western Metal Exposition and Congress will be held by the American Society for Metals in Los Angeles, announces Ray T. Bayless, the society's assistant secretary.

Dates for the 11th presentation of this educational dual event will be March 16–20. The exposition will be in Pan-Pacific Auditorium and special annexes, and the technical sessions in the Ambassador Hotel.

Chester L. Wells, the exposition's assistant director with offices at 7301 Euclid Ave., Cleveland, says the display will include new, improved, helpful materials and equipment.

CANADIAN CORROSION ENGINEERS MEETINGS IN EAST AND WEST

The Canadian Region, National Association of Corrosion Engineers is planning to hold two regional meetings instead of the usual one next year. The first meeting will be held in the East in Montreal, Quebec, January 12–14, 1959 with Harrison Burbidge, Aluminum Company of Canada, Limited, as chairman. The second, Western meeting, will be held in Calgary, Alberta, February 11–13, with D. Stewart McIntosh, Britamoil Pipe Line Company, Limited, as chairman.

Because of Canada's vast distances, meetings which have been held in Eastern Canada have been poorly attended by NACE members living in the Western part of the nation and the reverse has also been true of meetings held in the Western section. B. H. Levelton, B. C. Research Council, University of B. C., is chairman of the entire Canadian Region.

VACUUM COATERS TO MEET IN DETROIT

The annual fall meeting of the Society of Vacuum Coaters will be held at the Hotel Statler, Detroit, Michigan, on November 5 and 6, 1958.

Those interested in presenting a paper on the technical and practical applications and techniques involved in functional and decorative vapor deposition should send a 100 word abstract as soon as possible to F. Gruen, program chairman, Syn-Cote Chemical Corporation, Long Island City, New York.

Membership application cards can be obtained from M. Adler, membership chairman, Society of Vacuum Coaters, P. O. Box 3095, Cleveland 17, Ohio.

40TH NATIONAL METAL SHOW AT CLEVELAND

The 40th National Metal Exposition and Congress will be held in Cleveland, October 27–31.

Theme this year for the show, which makes its 11th return to the shores of Lake Erie, is "Make It Better With Metals . . . For Less." Nearly 500 exhibits are expected to occupy 300,000 square feet of floor space in Cleveland's Public Auditorium.

An attendance of about 50,000 is expected. At the 1957 Metal Show at Chicago, actual registration was 51,117.

Value of exhibits to line the red-carpeted aisles of the hall will approximate $5,000,000.

ASM headquarters will be jointly in Hotel Cleveland and in the Statler-Hilton.

There will be 150-plus scientific presentations. ASM itself will sponsor a grand total of 50 technical papers, plus 35 seminar and special session talks.

New at the 40th Congress will be the first "Billy Woodside Memorial Panels," honoring memory of an ASM founder-member. These are being arranged to appeal to management and production men in metalworking, as well as metals engineers and researchers.

A highlight will be a special three-day seminar in the Wade Park Manor on "Residual Stresses," the last two days of Metal Show week and for one day thereafter. This feature requires special registration and fee of $150. Lecturer will be Prof. Richard Weck of Cambridge University, England, director of research of the British Welding Research Association. Honorary chairman will be J. O. Almen, Los Angeles, retired General Motors Research Laboratories scientist who developed application of shot peening of springs, gears and other high stress metals.

Broadening scope of technical gatherings will be concurrent programs by seven cooperating groups.

The Fall Meeting of the Metallurgical Society, sponsored by the Institute of Metals Division, American Institute of Mining, Metallurgical and Petroleum Engineers, will feature four simultaneous meetings, Monday through Thursday, October 27–30, in the Pick-Carter Hotel. Included are the AIME's Iron and Steel Division and its Extractive Metallurgy Division. Eighteen subjects are on the calendar in addition to 16 sessions for presentation of abstracts.

The Society for Nondestructive Testing will gather at Hotel Manger during the Metal Show. The SNT is a cooperating Metal Congress society. Meetings are scheduled Sunday, October 26 through Friday, October 31. There will be more than 50 technical papers.

Annual meeting of the American Society for Metals will be at the Statler-Hilton, Wednesday morning, October 29. A highlight will be election of officers.

Numerous special luncheons, dinners, and other events will lend color and distinction to the gathering of 50,000 metalworking industry leaders from 48 states, Canada and several foreign countries in Cleveland, October 27-31.

Among foremost of these will be the ASM annual banquet, Thursday evening, October 30, in the Statler-Hilton.

Another will be the third annual ASM Awards Luncheon, Tuesday, October 28 in Hotel Cleveland. At the luncheon the Society, and cooperating groups, will present awards for outstanding achievement in the metals field.

Hours for the Metal Show in Cleveland Public Auditorium will be noon to 10:30 p.m. Monday, Tuesday, and Wednesday, October 27–29, and 10:00 a.m. to 6:00 p.m., Thursday and Friday, October 30–31.

EXHIBITORS SIGN FOR CORROSION SHOW

Thirty-nine companies already have contracted for 55 exhibition booths at the 1959 Corrosion Show, National Association of Corrosion Engineers. More than twice this number will exhibit, it is estimated. The 15th Annual NACE Conference and 1959 Corrosion Show will be held in Chicago, March 16–20, 1959.

ASME AND ARS TO HOLD SEPARATE MEETINGS

The American Society of Mechanical Engineers and the American Rocket Society will in the future hold national meetings independently of each other. Both 1958 Annual Meetings will be held in New York but on different days.

The announcement of the independent meetings, issued jointly by the two societies, indicated that the decision to hold separate meetings was dictated primarily by the expanding size of the technical sessions and limited hotel space

available. A second reason assigned was the "increasingly independent status of the field of rocketry and the concurrent growth of ARS from a small group to one of substantial stature in the technical field."

The 1958 ASME Annual Meeting will be held at the Hotels Statler-Hilton and Sheraton McAlpin, New York, November 30 through December 5; the 1958 ARS Annual Meeting will be quartered at the Statler-Hilton two weeks earlier, November 17–21.

In 1959, the ASME Annual Meeting will be held in Atlantic City while that of ARS will be held in Washington, D. C.

NEW ORLEANS MEETING OF NACE

Approximately 24 technical papers will be presented in four symposia during the technical program at the New Orleans meeting of National Association of Corrosion Engineers, October 20–24, 1958. It will be the twelfth annual meeting of the NACE South Central Region.

In addition to hearing technical papers in symposia, corrosion engineers will discuss their problems in more than 20 technical committee meetings. Preventive methods which are of a general nature, protective coatings and cathodic protection, will be discussed.

THOMAS ANTHONY TRUMBOUR

The AES was saddened September 2, 1958 by the death that day at St. Joseph's Hospital, Paterson, N. J. of Thomas Anthony Trumbour, 75, General Manager of "Metal Finishing" Magazine, a Charter Member of AES, a founder of AES's Newark Branch and Secretary-Treasurer of the Metal Finishing Suppliers' Association (MFSA). A wealth of friends throughout the industry grieve his loss.

Born in Butler, N. J., Tom, as he was familiarly known in electroplating and metal finishing circles, joined today's Metal and Plastics Publications, Inc. in the infancy of that publishing company in 1901, and was upgraded, step-by-step, to its General Managership about 1938. He served in that capacity to his death.

A stalwart of the American Electroplaters' Society since its formation as the National Electro-Platers Association a half-century ago, Tom was elected an AES Honorary Member by the Supreme Society in 1956, an honor only conferrable by majority vote of that summit AES governing council upon any person "whose knowledge and outstanding service have enhanced the welfare of the Society." He was a founding father and long-time Secretary, moreover, of the International Fellowship Club, forerunner of today's MFSA.

MFSA recently created an award embodying a $100 purse to be donated by that Association, after June 1, 1958, to each new AES Branch upon being chartered by the AES's Executive Board. As a token of MFSA's respect for Tom, it named that project, "The Thomas A. Trumbour Award."

Aside from his many plating and metal finishing interests, Tom was a Director of the Progressive Savings and Loan Association of Hawthorne, N. J. his home community; a member of the Holy Name Society and a Charter Member of the Knights of Columbus Council of Butler, N. J. He is survived by two sons, four daughters, two sisters, a brother, sixteen grandchildren and ten great grandchildren, plus many nieces and nephews.

His funeral at St. Anthony's Church, Butler, September 5 was attended by many relatives and friends, including a number of the leaders in the metal finishing industry who esteemed him highly in life and cherish his memory in death.

HERBERT C. GEITTMAN JR.

Herbert C. Geittman Jr., sales representative for Climax Molybdenum Company, a division of American Metal Climax, Inc., died recently. He joined the company in 1955 after service with the Richmond Foundry and Manufacturing Company, Inc., and with other foundries.

Mr. Geittman is survived by his wife and three children.

WILLIS M. FOTHERINGHAM

Willis M. Fotheringham, 60, president of his own electroplating firm, W. M. Fotheringham Inc., adjacent to his home at 975 Niagara St., Buffalo, N. Y., suffered a fatal heart attack Saturday evening, Aug 30, 1958, aboard his sailboat.

Better known as "Bill" to all of his AES friends, he was in the electroplating business for over 30 years.

In his earlier years he was a sales representative for Divine Brothers. In 1941, he formed his own electroplating business known as W. M. Fotheringham Inc.

Bill was a member of the AES Buffalo Branch for 20 years and held the offices of vice president and librarian. He was active on numerous committees through the years.

Survivors include a nephew, Charles R. Fotheringham, secretary-treasurer of the business, and four brothers, Robert L., Lakewood, O.; John, Toledo; Joseph H., Vista, Calif., and Alexander, Shaker Heights, O.

WILLIAM J. DURING

William J. During, 58, former president of Precision Castings Co., a division of Harsco Corp., died August 22.

Regarded as one of the country's leading authorities in the die casting field, Mr. During played a key role in the growth of the American Die Casting Institute. He was elected president of the Institute three times.

Mr. During became associated with the Precision company 35 years ago as chief engineer. Subsequently he became vice president and general manager. In 1953 he was elected president.

KENNETH COOKE BROWNELL

Kenneth Cooke Brownell, 55, Chairman of the Board of American Smelting and Refining Company and a leading United States industrialist, died Aug. 4 at Columbia Presbyterian Medical Center, New York City.

Mr. Brownell joined American Smelting and Refining in 1927 and came up through the ore purchasing and sales departments to vice president in 1936, executive vice president in 1947 and president in 1949. He was elected board chairman and chief executive officer in April 1957.

Mr. Brownell was active in other business, financial and charitable organizations. He was a director of Revere Copper and Brass Incorporated, General Cable Corp., The Chase Manhattan Bank of New York, the Great Northern Paper Co. and the First National Bank of Greenwich, Connecticut. He was a trustee of the Rockefeller Institute for Medical Research and a vice president and trustee of the John Simon Guggenheim Memorial Foundation. He was also a member of the Business Advisory Council of the Chamber of Commerce of the United States.

Mr. Brownell lived in Greenwich, Connecticut, where he was a corporate member of the Greenwich Hospital Association, a governor of the Field Club of Greenwich for ten years and a governor of the Round Hill Club. He was also a member of The Bankers Club of America, the Metropolitan Club of Washington, D. C., the Yale Club, the Union Club and a trustee of the Down Town Association of New York.

He is survived by his wife, two sons, and a daughter, his mother and a brother.

HENRY L. ZUCKER

Henry L. Zucker, 87, vice president of Hanson-Van Winkle-Munning Company, died Thursday, September 4, at his home, 14 Schanck Avenue, Matawan, N. J.

Mr. Zucker was born in New York City the son of the late George W. and Anna Mary Butz Zucker. He was a pioneer in the development and manufacture of buffing compounds, having succeeded his late father as president of the George Zucker Company which was merged in 1918 with the Munning-Loeb Company of Matawan, later to become A. P. Munning and Company.

Mr. Zucker was a member and former trustee of the First Presbyterian Church; a former member of the Borough Council; past president of the Board of Education; and one of the organizers and former president of the Liberal Building and Loan Association.

Surviving are his wife, Mrs. Louise Brown Zucker; two daughters, Mrs. Alice Harding and Mrs. Mildred Beam Kane; two sons, Henry G. Zucker and Harold F. Beam; seven grandchildren; a sister, Mrs. Arthur Gude, Caldwell, N. J.

Photo courtesy Hanson-VanWinkle-Munning Co.

with MANHATTAN RUBBER LINING

How can you be *sure* your costly pickling and plating equipment is *permanently* protected against corrosive solutions . . . the *solutions* protected against contamination? Manhattan rubber lining engineers have the answer. Thick, multiple calendered sheets of natural or synthetic rubber are bonded to the tank metal so securely they can't be separated! Manhattan *bonded protection* has kept many tanks in continuous use over 30 years!

Manhattan Rubber Linings eliminate the dangers of stray currents in plating operations. They expand and contract with metal, won't harden, crack or oxidize — even under extreme temperature changes. Every Manhattan rubber lined tank is tested under high voltage to detect any imperfection before it is shipped to your plant.

Be *certain* of lifetime protection for your costly equipment and be protected against contamination of expensive plating baths. Specify Manhattan Lining on your next equipment or let Manhattan handle your next tank lining job. Contact the Manhattan rubber lining facilities nearest your plant.

RM-837

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anodizing, buffing and cleaning

No matter what your aluminum finishing problem or need, you'll find the answer at H-VW-M . . . because it is the one company combining a complete engineering service with a complete line of equipment and supplies!

ELECTRICAL EQUIPMENT — Want the best possible recommendation of a Rectifier . . . Generator . . . or Control Equipment for your particular operations? Page 2 tells how to get it.

STILL TANK OR FULL AUTOMATIC EQUIPMENT — Whatever your need — from a single component to a complete, integrated system — H-VW-M supplies it . . . Page 3.

ENGINEERING SERVICE AND INSTALLATION — H-VW-M engineers and technicians are anodizing equipment specialists, with years of experience. Page 3 tells why these H-VW-M services mean greater efficiency and savings in your plant.

ALUMINUM FINISHING SUPPLIES — Page 4 shows how H-VW-M research has resulted in new compounds, improved buffs and cleaners to make aluminum finishing easier, better.

HANSON-VAN WINKLE-MUNNING CO. · MATAWAN, NEW JERSEY, U.S.A. ·

HANSON-VAN WINKLE-MUNNING COMPANY
MATAWAN, NEW JERSEY

Manufacturers of a complete line of electroplating and polishing processes, equipment and supplies

PLANTS: Matawan, N. J. • Grand Rapids, Michigan • Los Angeles, California (Alert Supply Co.)

Sales Offices: Anderson (Ind.) • Baltimore • Beloit (Wisc.) • Chicago • Cleveland • Dayton Detroit • Grand Rapids • Los Angeles (Alert Supply Co.) • Louisville • Matawan • Milwaukee New York • Philadelphia • Pittsburgh • Plainfield (N. J.) • Rochester • San Francisco (Alert Supply Co.) • Stratford • Toledo • Utica • Wallingford (Conn.) • West Springfield (Mass.)

These H-VW-M Anodizing and Finishing to New Savings, New Efficiency, New

ELECTRICAL EQUIPMENT

H-VW-M is the only manufacturer of both Germanium and Selenium Rectifiers *and* low voltage, direct current Motor Generator Sets for the metal finishing industry. This thorough experience in every phase of low voltage power generation and rectification means that when you bring your power problems to H-VW-M you're sure to get the perfect equipment recommendation.

Self-Contained Rectifier with Tap Switch Control

Remote Controlled Rectifier with Tap Switch Control

Germanium and Selenium Rectifiers . . . Rectifier Controls

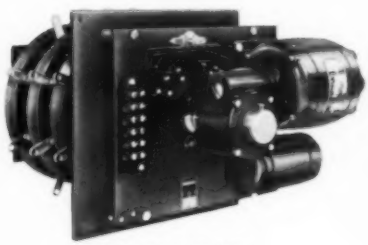
Highest quality and efficiency, flexibility, economy and low maintenance are the characteristics combined in H-VW-M's full line of both Germanium and Selenium Rectifiers. 6 to 48 volt units—both remote and self-contained—provide the exact direct current low-voltage and high amperage required in aluminum anodizing. The widest possible choice of controls and control combinations is available. Such devices as manual or motor operated tap switch controls, continuously variable auto-transformers and saturable core reactors are used with or without supplemental controls to provide automatic voltage stabilization, automatic constant current as well as automatic programming.

Write for Bulletin ER-108, which gives further information about Rectifiers and Controls, plus useful control application suggestions.

Manual Tap Switch Control

Saturable Core Reactor

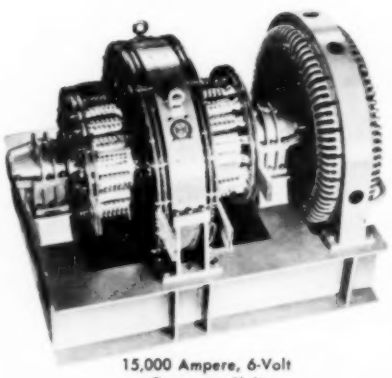
Continuously Variable Auto-Transformer



Motor Operated Tap Switch Control

Generators . . . and Controls

H-VW-M Motor Generators designed especially for metal finishing operations are built in sizes up to 50,000 amperes, and accessory equipment includes a full line of controls and control panels to cover any desired control function. Easy-to-maintain H-VW-M Motor Generators have exceptionally rugged and practical construction features insuring maximum performance and life. Standard voltage ratings range from 6 to 50 volts, and include the 18 and 24 volt units usually required for sulphuric acid anodizing, plus the 40 and 50 volt units used in chromic acid anodizing. Write today for 24-page Bulletin G-104, covering in detail all H-VW-M Generators.



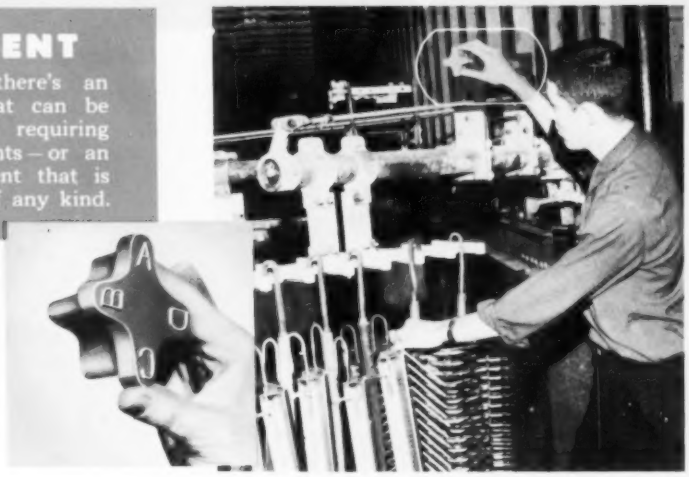
15,000 Ampere, 6-Volt Generator Unit

Automatic Anodizing Control Panel

Supplies, Equipment and Services Add Up Simplicity of Operation in Your Plant

PROCESSING EQUIPMENT

Whatever your anodizing procedure, there's an H-VW-M Full Automatic Conveyor that can be adapted to any production application requiring automatic cycling of individual treatments – or an H-VW-M Tank with accessory equipment that is perfectly adapted to still tank methods of any kind.



Workman "dials" desired cycle in refrigerator plant. Parts will by-pass or lower into baths as dial setting dictates.

Automation in Metalfinishing— *Full Automatic Conveyors with Dial-A-Cycle*

H-VW-M's new DIAL-A-CYCLE system automates nine or more complete metalfinishing processes on a single anodizing or electroplating machine. This revolutionary by-pass mechanism can be used on any metalfinishing installation for anodizing, electroplating, or similar processing. It is especially useful and effects substantial cost reductions when a variety of parts requires several different processes or colors.

DIAL-A-CYCLE, as the name implies, is controlled by a simple dial setting. The dial is mounted on the carrier arm that carries the parts through processing tanks. It is set by the machine operator for the processing steps through which each load of unfinished parts is to move. Automatic conveying then takes over, lowering the parts into the required tanks and bypassing others.

Different products, requiring different anodizing cycles, may be processed at the same time, with the same equipment. DIAL-A-CYCLE gives you new versatility while reducing operating, labor, and maintenance costs. Close, automatic control of transfer and immersion periods improves quality.

DIAL-A-CYCLE is the newest of many types of conveyors and equipment H-VW-M supplies to aluminum finishers. H-VW-M also designs, manufactures, and installs return-type conveyors . . . elevator conveyors . . . straight-line conveyors . . . and others. For a complete description of all types, write for Bulletin FA-105.

Tanks and Equipment

At H-VW-M – the plating and anodizing industry's workshop—you'll find tank equipment for every phase of your work. For chromic acid anodizing, H-VW-M double electric welded unlined steel tanks are offered, along with steel coil equipment for cooling and heating. The entire system is H-VW-M designed, supplied and installed. For sulphuric acid anodizing, lead-lined steel tanks, plus the necessary cooling coils and air agitation assembly, are supplied. Tanks are fabricated from hot rolled steel, stainless steel, and aluminum. Other types of tanks are also available. Bulletin No. T-108 gives full particulars about this important H-VW-M equipment. Every conceivable type of auxiliary equipment is engineered and supplied, according to customers specifications, including a complete packaged refrigeration system for anodizing solutions.

And H-VW-M's Engineering and Installation Service

Anodizing problems of *any* kind? H-VW-M is prepared to set up your entire anodizing system from beginning to end—a system made up of components scientifically engineered to work together with utmost efficiency. Because of this, and because of H-VW-M's continuing research and development in every aspect of the anodizing picture, you can be confident that the recommendation you receive from H-VW-M is the very *best*.

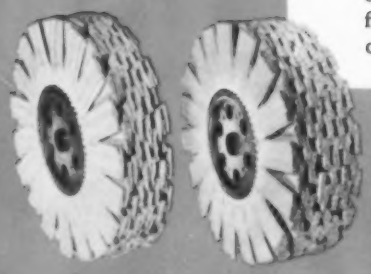
What's more, if requested, H-VW-M sees to it that the equipment you buy is H-VW-M *installed*. This means perfect, efficient operation from the start.

Add to this the fact that an H-VW-M technical representative—ready to serve you—is no further than your telephone. These representatives serve in principal cities across the nation. Get to know the one nearest you. He can help you get the most from your aluminum finishing equipment and supplies.

TURN THE PAGE FOR ALUMINUM BUFFING AND CLEANING SUPPLIES

ALUMINUM BUFFING AND CLEANING SUPPLIES

Since aluminum came into its own after World War II, considerable H-VW-M research and development work has been devoted to the perfection of buffs and compounds suiting the unique physical characteristics of this popular light metal. When long-wearing H-VW-M Buffs are used in conjunction with H-VW-M compounds especially formulated for aluminum finishing, you have the perfectly balanced combination for economy, efficiency and quality performance.



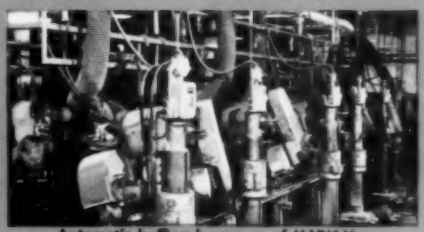
Buffs

Nowhere will you find a wider selection of the buffs you need for preanodizing operations than at H-VW-M. Whether you're looking for a super-heavy-duty buff like new steel-centered Ruff-L-Buffs (which are available untreated, or Binderized® for extra long wear) medium duty buffs like Triplex Buffs, or a buff for medium-to-light service such as the Full Disc Buff, you need look no further than H-VW-M. The full H-VW-M line also includes new Tufta-Flex Buffs (cloth tufts) and Sisal-Flex Buffs (with sisal-centered tufts).

Among this array you'll find the exact buffs for your aluminum finishing needs. Every one is characterized by first quality, uniform new material of close weave and good weight . . . tight sewing with heavy thread . . . and proper balance. Write for 12 page Bulletin B-103, which describes H-VW-M's entire buff line.

Compounds

Hand buffing using H-VW-M buffs, compounds.



Automatic buffing by means of H-VW-M Liquimatic System.

For heavy duty cutting, H-VW-M Liquid Tripoli Compounds 303 and 420 were developed, and are now widely used in the cooking utensil industry. For the appliance, storm window, construction materials and automotive fields, H-VW-M's new Liquimatic Liquid Compound No. 728 has proved especially successful, giving excellent cut, while leaving the surface with deep, high color.

H-VW-M Bar Compounds also find broad use in aluminum finishing. A variety of tripoli bar compounds are offered in varying consistencies to meet all cutting requirements. For cut and color, special white compounds are available. And for high color, several new H-VW-M aluminum oxide compounds—No.'s 6-B-168, 6-B-72 and 8390—give unusually good results. Write for Bulletin CO-103.

Cleaners

H-VW-M devotes constant research to the subject of cleaners in its search for ever better products in the aluminum finishing field.

Matawan Cleaners are designed specifically to give superior results in soak cleaning, power spray operations, oxide removal, and for special aluminum cleaning and etching operations. Of particular interest is H-VW-M's 858 Cleaner, which prevents scale formation, thus keeping coil and tank walls scale free. This unusual aluminum cleaner leaves an extremely bright surface, and, because of its built-in regenerator, makes maximum effective use of caustic in the bath.

In line with its desire to supply the exact cleaner for the job, H-VW-M offers its extensive laboratory facilities where circumstances demand a special cleaner.

When you think of aluminum finishing equipment and supplies—think of H-VW-M first. Buying from one dependable source . . . H-VW-M . . . means one company assumes full responsibility—your guarantee that you're getting the best . . . in products . . . in performance, in *extra* service.

PLATEMANSHIP

Your H-VW-M combination — of the most modern testing and development laboratory — of over 80 years experience in every phase of plating and polishing — of a complete equipment, process and supply line for every need.

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INDUSTRY NEWS

FREDERICK GUMM CHEMICAL APPOINTS FLORIDA DISTRIBUTOR

Frederick Gumm Chemical Company of Kearny, N. J. has announced the appointment of S. & S. Chemical Company for the Florida Area. Main office and warehouse is at 7220 N. W. First Court, Miami.

S. & S. will handle the complete line of cleaning, deburring, burnishing, aluminum treating and related compounds which have been in continual use in the metal finishing industry for many years.

The sales and service coverage resulting from this combination will provide the metal finishing industry in the area with a local source of materials.

HUBBARD-HALL BUYS CHEM-SALTS OF ATLANTA

The Hubbard-Hall Chemical Co., Waterbury, Conn., has purchased the majority interest in the firm of Chem-Salts, Inc., of Atlanta, Georgia formerly Metalsalts Chemicals, Inc., manufacturers of metallic chlorides and copper cyanide. Abner A. Towers, president of Metalsalts, will remain as president of the newly named firm, with Edward R. Jones, also executive vice president of Hubbard-Hall, as vice president. Charles T. Kellogg, treasurer of Connecticut Chlorine Products, a wholly owned subsidiary of Hubbard-Hall, will be secretary and treasurer of Chem-Salts.

Hubbard-Hall, which was founded in Waterbury in 1849 as a drug store known as The Apothecaries Hall Co., received its new name on January 1, 1957, when three New England fertilizer manufacturers and agricultural chemical distributors were merged into The Apothecaries Hall Co. It presently operates several plants in Waterbury, Connecticut, and plants at North Haven, Portland, and East Windsor, Conn., and South Deerfield, Mass. It operates a number of warehouses for the distribution of its products throughout the Northeast, the principal one being on Route 128 at Needham, Massachusetts.

For many years, Hubbard-Hall has been active in the metal finishing supply trade. It operates a nickel foundry in Waterbury for the manufacture of nickel anodes. Copper cyanide is one of the products of Chem-Salts Inc. Chem-Salts Inc., will continue to operate from its office and plant in Atlanta, Georgia.

WHEELABRATOR ACQUIRES CRANDALL ENGINEERING

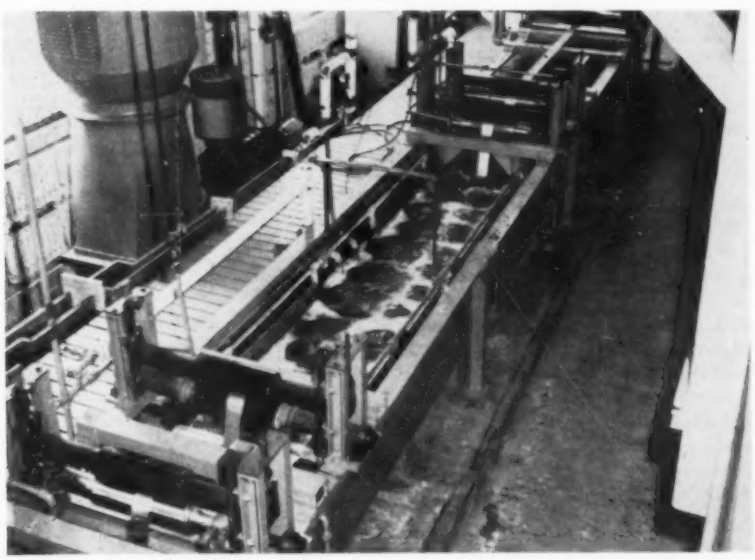
Formation of a new barrel finishing and wet blasting division of Wheelabrator Corp., Mishawaka, Ind., has been announced by Wheelabrator president, James F. Connaughton.

The 50-year old company, one of the leading manufacturers of airless blast cleaning equipment, dust control systems, and steel abrasives, has been a wet blasting machine manufacturer for the past eight years. By acquiring the assets of Crandall Engineering and Manufacturing, Inc., Vicksburg, Mich., the company adds a complete line of barrel finishing machines. Manufacturing and sales headquarters will be in Vicksburg. Complete experimental and demonstration laboratories will also be maintained there.

General manager of the new division, to be known as Techline, will be Jacob A. Schmidt Jr., secretary-treasurer of the parent company. George H. Lieser will be wet blast product manager and Roy T. Romine will be barrel finishing product manager and chief engineer.

Before joining Wheelabrator, Mr. Lieser was a manufacturers agent in the Cleveland area, selling liquid blasting equipment primarily. A civil engineering graduate of Iowa State College, he has operated his own consulting engineering firm, held sales positions with pump and diesel engine manufacturers and has served on the supervisory force of an ordnance plant. He is a registered professional engineer and is a member of the Society of Automotive Engineers.

Mr. Romine, prior to founding Crandall, was chief engineer for a barrel finishing manufacturer. A mechanical engineer, he is a graduate of the University of Michigan. He is a member of the American Society of Tool Engineers and the American Electroplaters' Society.



High-speed strip anodizing test line recently installed at the Matawan, N. J. plant of Hanson-Van Winkle-Munning.

H-VW-M HAS NEW TEST LINE

A new test line for solution of problems in continuous high-speed strip anodizing, sealing and dyeing processes has been set up at Matawan headquarters of Hanson-Van Winkle-Munning Co. The facility was built to satisfy demand for anodized aluminum strip to be used for fabrication.

It is designed also for study of problems in the electroplating, etching, cleaning, pickling and other industrial process requirements for high speed continuous treatments.

Completely automatic, the new line is said to be the first of its kind to be operated by an equipment manufacturer. It may be arranged and equipped so as to duplicate exactly the conditions prevailing in a given plant operation.

The line, which is available to the firm's customers in the aluminum and steel industries, will also be used to attain basic research objectives in new strip anodizing and plating techniques.

FOR EVERY PLATING AND METAL FINISHING PLANT REQUIRING WASTE ANALYSIS METHODS

Procedures for Analyzing Metal Finishing Wastes

Comprehensive manual of 102 pages containing precautions to be observed in collecting samples of metal finishing wastes, fundamentals of sampling techniques, the determination of cyanide, cyanate, cadmium, chromium, copper, iron, lead, manganese, nickel, zinc, ammonia, chloride, chlorine, nitrate-nitrite nitrogen, ortho-phosphate, and sulfate —and a section on pH and residue.

This valuable publication, developed from American Electroplaters' Society Research Project at Lehigh University and expanded and prepared by the Metal Finishing Industry Action Committee of the Ohio River Valley Sanitation Commission is available at

Only $1.00

prepaid with order.

American Electroplaters' Society, Inc.

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ARMOUR RESEARCH ADDITION NEARS COMPLETION

A $1,200,000 addition to the metals research building at Armour Research Foundation of Illinois Institute of Technology, Chicago, will be dedicated Monday, Oct. 20.

The event will mark the completion of the second step in a 10-year expansion program announced by the Foundation early in 1956.

The four-story addition will more than double the amount of previously available space for metals projects.

The four floors of the addition will provide space for research sections of electrochemistry, and applied, powder, reactor, physical, and nonferrous metallurgy, as well as new reception and administrative offices for the department.

The basement will house a creep laboratory, mechanical equipment, and a storage area.

The original metals building will be devoted entirely to pilot plant and other large-scale operations, including the welding, foundry and steelmaking, and metallurgical processes sections.

Plans call for the construction of two more buildings and another extension to an existing building to complete the 10 year ARF expansion program.

ZINC AND LEAD INDUSTRIES NAME RESEARCH DIRECTOR

Dr. Schrade F. Radtke has been appointed to head the joint research program currently being initiated by worldwide lead and zinc producers. He was director of the metallurgical research laboratories of Reynolds Metals Co. at Richmond, Virginia, a lecturer on the staff of the Research and Development Division of the American Management Association and president of the Richmond, Va. chapter of the American Society for Metals.

According to Simon D. Strauss, vice president American Smelting and Refining Co., and chairman of the joint program's executive committee, Dr. Radtke has been chosen to manage research projects under the direction of the industry development committees of the American Zinc Institute, Inc. and the Lead Industries Association.

In cooperation with the technical steering committees of each Association, Dr. Radtke as research director will develop plans governing the research projects of the respective associations and will recommend the degree of emphasis to be placed on fundamental and applied research. Mr. Strauss reported that no limit has been set by the sponsoring producers on expenditures for research. Funds will be provided for any project receiving approval of the respective industry development committees.

Mr. Strauss stated that the new joint research program has the support of lead and zinc producers in Australia, Canada, Britain, Mexico, South America and the United States. These companies are: American Metal Climax, Inc., American Smelting and Refining Co., American Zinc, Lead and Smelting Co., The Anaconda Co., Athletic Mining & Smelting Co., The Broken Hill Associated Smelters Proprietary Ltd. (Australia), The Bunker Hill Co., Cerro de Pasco Corp., Combined Metals Reduction Co., The Consolidated Mining and Smelting Co. of Canada Ltd., The Consolidated Zinc Corp. (England), The Eagle-Picher Co., The Electrolytic Zinc Co. of Australia, Hudson Bay Mining and Smelting Co. Ltd., Matthiessen & Hegeler Zinc Co., National Zinc Co., The New Jersey Zinc Co., St. Joseph Lead Co., United States Smelting Refining and Mining Co.

Companies, research agencies, and universities will be engaged in the world-wide effort. The American Zinc Institute is currently sponsoring projects concerned with wet storage stain in galvanized sheet products, improved and more economical finishes for zinc die castings, and practical and efficient ways of applying zinc anodes for cathodic protection to name a few.

AMERICAN BUFF AWARDED U. S. TRADEMARK

The U. S. Patent Office has granted the American Buff Co., Chicago, exclusive permission to use the trademark, "Golden Treated" on buffs impregnated with the company's Golden Treatment process. The new trademark is covered by T. M. Serial No. 34,495.

The "Golden Treated" process, developed by American Buff engineers after four years of research, has reportedly proved a factor in improving buff performance. The treatment strengthens and binds together the fibres of any cotton or sisal buff, providing firmer body and eliminating frayed fibre ends.

TROY PLATING HAS NEW PLANT

The Troy Plating Works, Inc. occupied its new quarters at 514 South Laflin Street, Chicago, on September 1.

The move from the company's old headquarters at 2033 North Halsted after a period of approximately two years was necessitated by the need for expanded capacity and increased facilities.

The new plant occupies 7800 sq ft of floor space. In its new home, the metal plating firm will also incorporate metal fabricating, including stamping and tube bending, as a new feature of its operation.

Fully equipped with high speed metal plating processes, Troy Plating Works specializes in finishing copper, nickel, chrome, brass, bronze, gold, silver, lacquering, polishing and buffing, satin and oxidized finishes and paint fill and masking.

ENTHONE SEMI-ANNUAL SALES CONFERENCE

Enthone, Inc., subsidiary of American Smelting and Refining Company, recently held its semi-annual sales conference at the home office in New Haven, Connecticut. New Enthone developments in metal finishing chemicals and equipment were introduced to the sales engineers by Dr. Walter R. Meyer, president. Clarence C. Helmle, vice president for sales, presided at the four-day conference. (Front row, l. to r.) F. A. Schneiders, R. B. Goodsell, L. J. Durney, D. S. Hartshorn, J. E. Rhoads, J. R. Eisele, W. K. Murray, L. V. Gagnon, E. B. Washburn; (back row, l. to r.) P. L. Veit, A. F. Fletcher, A. H. Sanders, A. R. Tefft, H. M. Goldman, Dr. A. J. Phillips, director of research, Asarco; Dr. W. R. Meyer, L. J. Molnar, C. C. Helmle, A. J. Kolb, J. H. Shockcor, D. F. Seymour, L. H. Butcher Co., C. Schaefer.

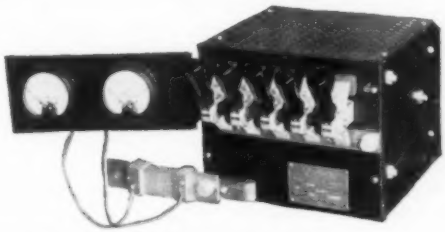
GRAVER WATER CONDITIONING FORMS NEW DEPARTMENTS

Services of the Graver Water Conditioning Co., New York, have been expanded by the regrouping of major sales areas and the formation of new departments. The new sales structure announced by the company covers the following fields: industrial, municipal and utility water treatment; industrial waste treatment; chemical processing; foreign operations, and process engineering. Managers have been named for each of them.

In the realignment, the sales engineering department has been replaced by the process engineering department consisting of process engineers and sales engineers. They will work as a team in developing technical solutions for the customer's problem and in obtaining any technical or engineering department assistance that may be required.

Announced recently as part of this program was the formation of a chemical processing department and a new foreign operations department. Rounding out the changes, the former advertising department has been renamed the sales promotion department and has been given additional responsibilities.

The new managers and the posts they will hold are as follows: George Apfel, process engineering; N. S. Chamberlin, chemical processing; J. D. Crell, foreign operations; Robert Dvorin, industrial waste treatment; E. A. Strahlendorff, industrial water treatment; R. S. Lewis, sales promotion.



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Cast-Grid Resistors are designed with liberal capacity to withstand intermittent and momentary overloads. Switches are self cleaning and give positive contact, conveniently located for ease in adjusting tank voltage to the load.

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Best Barrel Nickel

●

Some things cannot be done except at full speed or in full size. A nail making machine cannot be operated at low speed. An atomic explosion requires at least so much fissionable material. Barrel plating is much the same way. Small scale tests just won't give the answers or prove anything. As a result many claims are made on the basis of tests made under conditions different than the actual plating.

●

There are certain considerations inherent in barrel plating technique which are important. In general cleaning in barrel plating cannot be maintained at as consistent high level as in still tank work. The handling is necessarily slower and the plating of the mass means slower coverage. Good adhesion is thus harder to attain, and many excellent addition agents for still tanks are not suitable. Breakdown products of organic compounds are especially troublesome.

●

True Brite Barrel Nickel Brightener has been used for over twelve years and has proven consistent and trouble free. Ample information is available to help you determine the cause of difficulties. Further than this the cost of use is less. True Brite supplies a concentrated brightener which requires less to do a definite job. Tolerances are wide so that a reasonable variation causes no trouble. Ample brightening power is available to match the best still tank plates. Our best boosters are the larger companies with competent technical staffs who have been users for many years. You'll never know what you're missing in barrel nickel plating until you've used True Brite Nickel Brightener in real production runs.

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INDUSTRY NEWS BRIEFS

ZIRCONIUM COATING PATENT

Amchem Products, Inc. (formerly American Chemical Paint Company), Ambler, Pa., has been granted U. S. Patent No. 2,836,525, which deals with the coating of zirconium and its alloys.

The fundamentals of this patent have been and are being utilized commercially to produce a chemical conversion coating which facilitates the drawing of zirconium tube and shapes. The chemical process being marketed by Amchem is known to industry as Granodraw ZR.

COPPER IN OVERSUPPLY DURING 1957

Throughout 1957 the copper industry was faced with the continuing problem of oversupply which was not relieved by the 25 per cent drop in the price of copper nor by the efforts of most producers to curtail mine output at many of the major domestic-producing units, according to the Bureau of Mines, U. S. Department of the Interior. Continued development towards capacity production at new mines and expanded facilities at other operations offset cutbacks announced by producers, and a high level of mine production was maintained throughout the year.

Despite efforts of producers to bring supply in balance with demand by curtailing production, domestic mine output decreased only 2 per cent from the all-time high of 1956. One new mine, the Pima in Arizona, began to produce in January.

NEW MOLYBDENUM AND TUNGSTEN CHEMICALS

Three new chemical products—molybdenum hexacarbonyl, tungsten hexacarbonyl and tungsten hexachloride—are now being produced in semi-works quantities by Climax Molybdenum Company, a division of American Metal Climax Inc. According to Dr. H. W. Schultze, manager of New Chemical and Catalyst Development for Climax, the production of these versatile chemicals at the firm's Langeloth (Pa.) plant, marks the first time that they are available in sufficient supply for industrial application.

The three materials along with a fourth, molybdenum pentachloride are claimed to have a number of application possibilities. These include vapor phase deposition of molybdenum and tungsten metals, catalysis, and a variety of chemical reactions using these intermediates.

Two processes for producing metal coatings of tungsten and molybdenum are based on these chemicals. In the first, molybdenum pentachloride or tungsten hexachloride is hydrogen reduced to deposit coatings of molybdenum or tungsten, respectively. In the second, molybdenum or tungsten hexacarbonyl is thermally decomposed in an enclosed system to form coatings of the metals.

METALS PROGRAM ON RADIO

The field of metals will be featured by Alex Dreier on a nationwide radio program Sunday, October 26, according to an announcement by G. MacDonald Young, president of the American Society of Metals.

The program will be broadcast at 6:05 P.M. (E.D.T.) over the entire NBC network of nearly 200 stations. Mr. Dreier's tribute will tie in with the National Metal Exposition & Congress which begins the following day, October 27, at the Public Auditorium in Cleveland.

The broadcast is one of a series of salutes to different fields of American endeavor and professional activity, called "America on the Go."

PATENT ABSTRACTS

DR. D. GARDNER FOULKE
Manager, Electrochemical Development
Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,834,691, 5/13/58—Preparing Metal Surface for Coating—W. B. Stephenson and D. H. Greisi, assignors to General Electric Co., New York.

The method of treating ferrous articles includes the steps of treating the article with an aqueous solution including 6 to 9 per cent hydrated sodium sulfate and 6 to 11 per cent of hydrochloric acid (37 per cent by wt) until a soft bonding film is produced on the surface of the article. Rinse, heat to 400 to 440 F to convert to a hard adherent film.

4 claims.

No. 2,834,723, 5/13/58—Plating Printed Circuits—J. Robinson, assignor to Northern Engraving and Mfg. Corp., La-Crosse, Wis.

Claim 1 states: "The method of electroplating the conducting elements of a multi-part printed circuit formed on the face of a non-conducting base, comprising the steps of: masking a fragmentary portion of each conducting element while leaving a fragment of each element exposed along the margin of the masked portion; covering the entire face with a removable electrically conducting coating; applying an electrically non-conducting coating over the electrically conducting coating; removing the first mask and the coatings thereon to expose the masked portion and define a unitary conducting area including the electrically conducting coating and the conducting elements of the printed circuit; electroplating onto the face using the said conducting area as one electrode; and removing the remaining portions of the coatings to restore the original circuit configuration.

4 claims, 7 figures.

No. 2,834,724, 5/13/58—Plating Plastic Articles—Abraham P. Mendes, New York, N. Y.

The method consists of forming first on the plastic article a coating of Sb, Bi, or As in a vapor vacuum chamber, then plating on said metallic coating a noble metal by electrodeposition.

6 claims.

No. 2,834,725, 5/13/58—Co-Ni Electroplating—H. Schur and E. Yerk, assignors to International Business Machines Corp., New York, N. Y.

A cobalt-nickel alloy plating bath consisting of a water solution of chlorides of the metals along with boric acid and small amounts of thiocyanate, i.e., 5×10^{-4} to 5×10^{-2} g/l.

6 claims.

No. 2,835,616, 5/20/58—Oxalate Coatings on Metals—W. Rausch and F. Gonnert, assignors to Parker Rust Proof Co., Detroit, Mich.

The method consists of subjecting the metal to (1) an acid polishing treatment to remove the scale and (2) an alkaline rinse in a solution containing 5 to 25 per cent of an alkali metal hydroxide (3) 0.02 to 1 per cent of an activating ion (cyanide, thiocyanate) and (4) an oxalate coating solution to form a tightly adherent coating.

7 claims.

No. 2,835,630, 5/20/58—Treatment of Metals Prior to Plating—R. Huddle and O. Flint, assignors to U.S.A. (AEC).

Uranium, zirconium, titanium, tantalum, niobium, molybdenum, tungsten and vanadium surfaces are first shot-blast with ferrous metal shot, then the surface is coated with copper and finally by a protective metal. The copper is preferably deposited by displacement from a copper salt solution. The example calls for immersion in:

Copper sulfate	200 g/l
Sulfuric acid	48 g/l
Aluminum sulfate	24 g/l
Wetting agent	0.1 per cent

for 5 minutes.

4 claims.

No. 2,836,400, 5/27/58—Plating Barrel—W. Jackson, assignor to Udylite Corp., Detroit, Mich.

A barrel for plating small parts, constructed with a novel rigid frame assembly having a plurality of corner frame members and interconnecting cylinder side wall panels, is described.

8 claims, 7 figures.

No. 2,836,510, 5/27/58—Nickel Plating by Chemical Reduction—Edward J. Bolin, assignor to General Motors Corp., Detroit, Mich.

The single claim is as follows: "A process for plating nickel on a metal article which comprises the steps of providing an aqueous chemical reduction plating bath comprising 5 to 50 g/l of a soluble nickel salt, 5 to 100 g/l of a hypophosphite reducing agent, 15 to 100 g/l of a compound selected from the group consisting of glycollic acid, lactic acid, and acetic acid and .01 to .05 g/l of a material selected from the group consisting of glue and gelatin, adjusting the *p*H of said bath to within the range of 3 to 6.5, heating said bath to a temperature within the range of about 170 to 200 F and while said bath is maintained to a temperature within this range, immersing the metal article to be plated in the bath until the desired thickness of nickel plate is deposited thereon, and thereafter subjecting the plated article to a heat treatment at a temperature within the range of about 350 to 800 F for a time of at least one hour to improve the ductility and corrosion resistance of the nickel plate.

1 claim.

No. 2,836,513, 5/27/58—Chromizing—G. Samuel, assignor to Metal Diffusion, Inc., Philadelphia, Pa.

The method is designed to avoid the necessity of packing chromizing material and articles in a box. The ferrous metal articles are coated with a watery dispersion of chromium and the complex fluoride of ammonium and chromium along with an inert bodying agent. The articles are then heated to 1600 to 2200 F in a closed space during which the atmosphere supplied by the complex fluoride exerts a protective influence.

1 claim.

No. 2,836,515, 5/27/58—Gold Immersion Solution—F. McNally, assignor to Westinghouse Electric Corp., East Pittsburgh, Pa.

A gold immersion solution for treating silver surfaces consists of gold chloride and water. A *p*H of 1.0 to 0.3 is maintained with sulfuric or hydrochloric acids. The second claim describes the addition of a buffer (citrate, acetates).

2 claims.

No. 2,836,525, 5/27/58—Method for Coating Zirconium—G. Otto, assignor to American Chemical Paint Co., Ambler, Pa.

A chemical treatment to minimize the galling properties of

zirconium and which will permit a subsequent siccative or other applied finish may be obtained from a sodium fluoride bath. The bath is given as:

Sodium . . . . 1.25 to 11 g/l
Fluoride . . . 15 to 35 g/l

and the operating range is shown by a graph considered a part of the claim. The *p*H is given as 3.5 to 4.8 and the temperature as less than 150 F.

1 claim.

No. 2,836,526, 5/27/58—Aluminum Surfacing—M. Marosi, Los Angeles, Calif.

The claim states: "The process of coating aluminum products with a thin layer of adhering material formed by the chemical action upon aluminum oxide of a formulated water solution of sulfamic acid, citric acid, sodium acid fluoride and an anionic wetting agent in the ratio of 1:1:0.33:0.05, respectively.

14 claims.

No. 2,836,548, 5/27/58—Surface Treatment of Uranium—A. Gray and E. Schweikoher, assignors to U. S. A. (AEC).

A method is described whereby uranium can be treated to receive subsequent coatings, especially electroplates. The surface of the uranium is treated for about 1 minute in aqueous 40 to 55 per cent nitric acid solution, then with 30 to 40 per cent hydrochloric acid until it is etched black after which it is again treated in the nitric acid bath to yield a gray etched metal surface.

4 claims.

No. 2,836,549, 5/27/58—Nickel Plating Bath—F. Nobel and Barnet Ostrow, assignors to Elechem Corp., Jersey City, N. J.

The reaction product of acetylenic halides and acetylenic alcohol halides (2 to 15 c's) with an alkylene polyamine (2–12 amino groups, alkylene of 2 to 3 c's) is described as a nickel brightener. The amount recommended is 0.001 to 1.0 g/l.

8 claims.

No. 2,836,550, 5/27/58—Chromium Plating Aluminum—W. MacLean, assignor to Chemical Research Corp., Miami, Fla.

Claim 12 states: "The method of providing a long life chromium bath solution for plating aluminum with a chromium finish that is highly ductile, crack free on bending and one that is easily buffed; which comprises providing a bath consisting essentially of a mixture of chromic acid and the sulfate radical; and operating the bath at a given low temperature selected from between 35 and 50 F with the use of a low density current for a period of not more than 5 min; said bath temperature being held constant at the selected level to counteract excessive gassing of said bath and to counteract the formation of trivalent chromium and continuously supplying chromic acid and the sulfate radical to said bath to maintain the same mixture ratio concentration in said bath solution for chromium plating aluminum.

13 claims.

No. 2,836,552, 5/27/58—Treatment for Nickel for Plating Chromium Thereon—J. Patrick, assignor to General Motors Corp., Detroit, Mich.

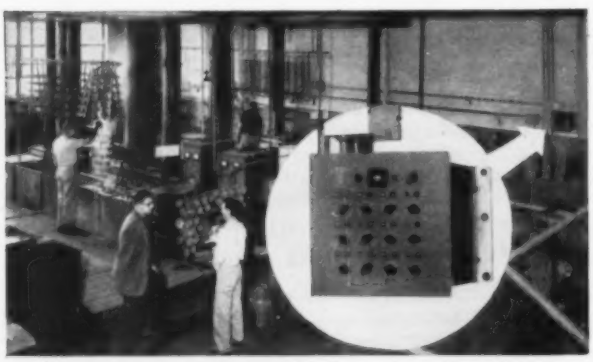
To activate a nickel surface for chromium plating electrolyze in a bath of 2 to 6 oz/gal of chromic acid containing 0.05 to 0.30 oz/gal of sulfate at 60 to 160 F at 2 to 12 asf, nickel the cathode, for 30 sec to 3 min.

2 claims.

No. 2,837,442, 6/3/58—Chromizing Molybdenum, Tungsten and Their Alloys—R. Seely and R. Wachtell, assignors to Chromelley Corp., New York, N. Y.

A glossy chromium-rich layer may be put on molybdenum, tungsten, and alloys thereof by holding the article at 1900 F in an oxygen free atmosphere in the presence of ferro-chrome, an inert filler, a volatile halide and a minor quantity of free iron (at least 3 per cent of pack).

5 claims.



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Industrial Instruments INC.
89 Commerce Road, Cedar Grove, Essex County, N. J.

No. 2,837,445, 6/3/58—Chemical Nickel Plating—P. Talmey and D. Metheny, assignors to General American Transportation Corp., Chicago, Ill.

An improvement in chemical nickel plating involving the addition of lactic and propionic ions in the ratio of 0.03 mole of lactic and 0.005 mole of propionic are added per 0.08 mole of nickel added is claimed.

7 claims.

No. 2,837,449, 6/3/58—Phosphating—B. Blaser, assignor to Henkel and Cie, Dusseldorf-Holthausen, Germany.

The phosphatizing solution consists of the addition product of phosphoric acid and an amide of a low molecular weight carboxylic acid (1–3 c's) in water.

7 claims.

No. 2,837,472, 6/3/58—Electroplating Brighteners—W. Gundel, et al, assignors to Dehag Deutsche Hydrierwerke GmbH, Dusseldorf, Germany.

Addition agents for copper, nickel and zinc are described as selected from the group of organic sulfonic acids of structural formula:

$$Z{-}N{-}RSO_3H \text{ and } Z = N{-}R{-}SO_3H$$

(R_1 is attached to N)

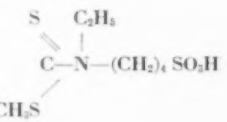
and their salts wherein

Z is a radical comprising a carbon atom attached directly to S to an atom selected from S, O, and N and to the nitrogen of $N{-}R{-}SO_3H$

R is a bivalent organic radical (aliphatic, aromatic)

R_1 is H and aliphatic radicals

an example is:



14 claims.

No. 2,837,474, 6/3/58—Corrosion Inhibition—G. Cartledge, assignor to U. S. A. (AEC).

Corrosion of ferrous metals in aqueous medium can be inhibited by maintaining a concentration of 5×10^{-5} molar pertechnetate ion in the medium.

12 claims.

No. 2,835,617, 5/20/58—Composition for Coating Metallic Surfaces—James Maurer, assignor to Parker Rust Proof Co., Detroit, Mich.

Claim 1 reads as follows: "An aqueous solution for coating a continuous hot-dipped, zinc-coated ferrous surface comprising as the essential coating-producing ingredients about 0.5 to 2.5 per cent phosphate ion, a metal ion of the group consisting of the zinc ion and the manganese ion in a proportion at least sufficient to form dihydrogen phosphate with said phosphate ion, 0.01 to 0.4 per cent nickel ion, at least one oxidizing ion from the group consisting of the nitrate ion and the nitrate ion in a concentration of about 0.2 to 1 per cent nitrate ion and 0.0002 to 0.008 per cent nitrite ion, and a silicon-containing ion in a proportion sufficient to produce at least 0.03 per cent soluble silicon. 8 claims.

No. 2,838,417, 6/10/58—Acidizing Industrial Equipment—B. Robinson, et al, assignors to Dow Chemical Co., Midland, Mich.

The steps include (1) treating the ferrous surface with acid, (2) rinsing to *p*H of 2, (3) treat with alkaline solution of *p*H 7 to 10, (4) treat with an aqueous nitrite containing solution and (5) allow to drain.

3 claims.

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150 GALS. PER HR.

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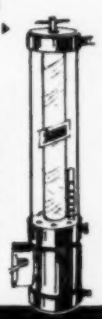

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No. 2,838,429, 6/10/58—Storage Battery Electrolyte—C. Sanders, Arenas Valley, New Mexico.

The battery electrolyte is 0.5 to 10 per cent mellitic acid.

1 claim.

No. 2,838,430, 6/10/58—Anti-Galling Titanium Surface—H. Argenta and J. Johnston, assignors to Ford Motors Co., Dearborn, Mich.

Immerse the titanium article in a barium-rich molten salt bath at 1575 to 1625F for 5 to 40 min, quench in oil, and immerse in a molten salt bath at 1025 to 1075F for 5 to 40 min.

4 claims.

No. 2,838,448, 6/10/58—Copper and Brass Plating Brightener—D. France, Brooklyn, N.Y.

The brightener consists of 2 oz of sodium arsanite, 20 oz sodium nitrate, 10 oz sodium zincate, 20 oz sodium hydroxide, 16 oz of methyl alcohol, 16 oz of formaldehyde, 32 oz wetting agent, 1 to 5 g tetraethylrhodamine in one gallon of water.

2 claims.

No. 2,839,370, 6/17/58—Aluminum Etching—D. Foulke and O. K. Irgens, assignors to Hanson-Van Winkle-Munning Co., Matawan, N. J.

An aluminum etching bath is described as an aqueous alkaline etching solution containing at least one of the compounds of the group pentaerythritol, tetrahydrofurfuryl alcohol and 1,2,4-butane-triol.

No. 2,839,428, 6/17/58—Inhibiting Oxidation of Tin-Plate—A. Laubscher, assignor to U.S. Steel Corp., N. J.

Polyalkylene glycols with a viscosity less than 500 centipoises at 25C, a vapor pressure of less than 10 mm of mercury at 227C and a molecular weight of about 625 is claimed to inhibit oxidation of a tin surface.

2 claims.

No. 2,839,437, 6/17/58—Dull Finished Tin Coating—J. Manko, assignor to Jones and Laughlin Steel Corp., Pittsburgh, Pa.

Apply to the matte tin surface an aqueous solution of an oxidizing agent (alkali metal nitrates, chlorates or H_2O_2) dry, heat-flow, quench.

5 claims.

No. 2,839,439, 6/17/58—Composition for Producing Phosphate Coatings on Metallic Surfaces—John Stapleton, assignor to Detrex Chemical Industries, Detroit, Mich.

An adherent uniform phosphate coating on steel is claimed possible by spraying the article with an aqueous solution of an alkali metal dehydrogen phosphate in the presence of 0.4 to 0.76 per cent by weight of nitrate and 0.0002 to 0.0005 per cent by weight molybdate ions as accelerators.

4 claims.

No. 2,839,455, 6/17/58—Anodizing Aluminum Coated Objects—H. LaTour and D. Perry, assignors to Armco Steel Corp., Middletown, Ohio.

Claim 1 is as follows: "A process of anodizing iron or steel articles having an aluminum coating of substantially 0.001 to 0.002 in. thickness which comprises making them the anodes in a solution of chromic acid and sodium hydroxide having a *p*H of substantially 6 to 7, at a temperature of substantially 175F for 15 sec, at an initial current density of substantially 200 amp/sq ft, and a potential of substantially 42 v.

7 claims.

No. 2,839,456, 6/17/58—Electroplating—D. Foulke and O. Kardos, assignors to Hanson-Van Winkle-Munning Co., Matawan, N. J.

The use of 2-(4-pyridyl) ethyl sulfonic acid as a nickel brightener is described.

6 claims.

No. 2,839,457, 6/17/58—Electroplating—D. Foulke and O. Kardos, assignors to Hanson-Van Winkle-Munning Co., Matawan, N. J.

A bright nickel plating process is claimed in which 0.01 to 1 g/l of an aromatic N-oxide is added to a nickel bath along with a sulfo-oxygen compound. An example is pyridine-N-oxide.

5 claims.

No. 2,839,458, 6/17/58—Electroplating—D. Foulke and O. Kardos, assignors to Hanson-Van Winkle-Munning Co., Matawan, N. J.

A bright nickel plating process is claimed wherein 0.05 to 5 g/l of an organic phosphinic acid (e.g. phenylphosphinic) is added to a nickel plating solution together with a sulfo-oxygen compound.

4 claims.

No. 2,839,459, 6/17/58—Electroplating—D. Foulke and O. Kardos, assignors to Hanson-Van Winkle-Munning Co., Matawan, N. J.

The use of α-aminopyridines, α-aminopyridazines, α-amino pyrimidines, α-aminopyrazines and α-amino-1,3,5-triazines are described as nickel brighteners.

6 claims.

No. 2,839,460, 6/17/58—Electroplating—D. Foulke and O. Kardos, assignors to Hanson-Van Winkle-Munning Co., Matawan, N. J.

A bright nickel plating bath is described as containing Class I sulfo-oxygen compounds and a bis-pyridyl compound in the amount of 0.001 to 1 g/l. An example is 2,2′-dipyridyl.

6 claims.

No. 2,839,472, 6/17/58—Non-Aqueous Electro-Conductive Electrolyte—M. Nevalonny, Farmingdale, N. J.

A bi-directional electro-conductive electrolyte consists of:

10 g sodium boroformate
30 g boric acid
7 mg curcumine
2.5 g potassium acetate
1000 cc triethylene glycol
20 cc triethanol amine.

Resistivity is given as 9,500 to 10,000 ohm-cm at 26C.

5 claims.

No. 2,840,219, 6/24/58—Rack Load—Unloader—C. Mervyn, et al, assignors to Newart Mfg. Co., Cleveland, Ohio.

Three claims and fourteen figures describe an automatic rack load-unloader for plating conveyors.

No. 2,840,498, 6/24/58—Corrosion Resistant Coatings—E. Logue and E. Bell, assignors to Parker Rust Proof Co., Detroit, Mich.

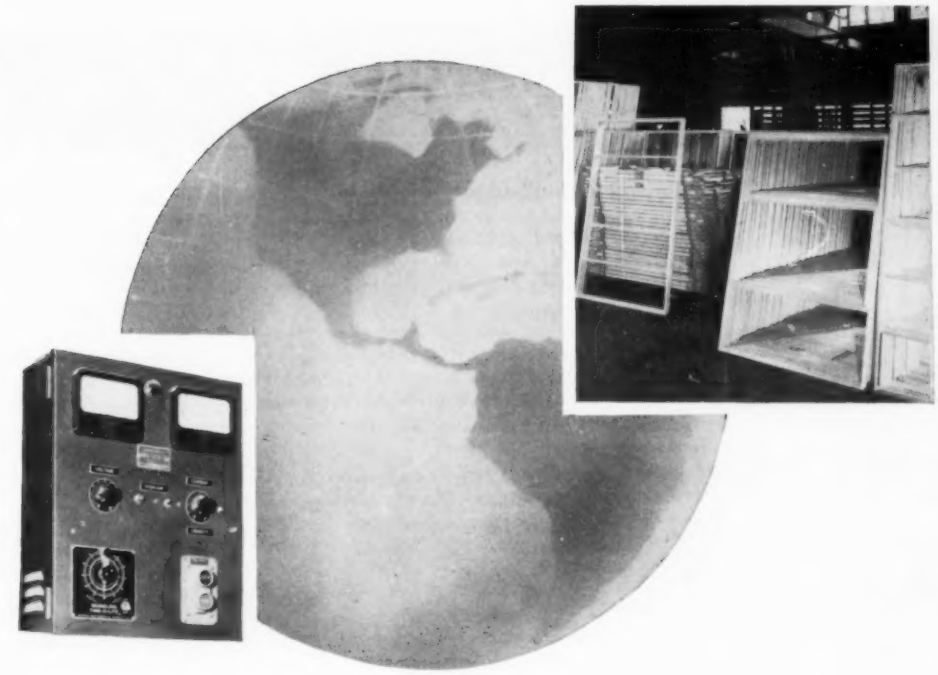
Corrosion-resistant, lubricating coatings can be formed on metals from an aqueous dispersion of a mono-aliphatic phosphoric acid ester (8 to 18 carbons), a metal ion which forms a salt with the said phosphate in an amount equivalent to 0.3 to 11 g/l of zinc and an amine in an amount sufficient to produce a *p*H between 3 and 5.5.

10 claims.

No. 2,840,517, 6/24/58—Nickel-Iron-Zinc Alloy Electroplating—C. Faust and W. Safranek, assignors to Rockwell Spring and Axel Co., Coraopolis, Pa.

The bath is an acidic solution of 17 to 233 g/l of nickel ions,

(Continued on page 1082)



"There's a world of difference in Anodizing when you have Automatic Current Density Control" . . .

. . . *says John Gurniak of*

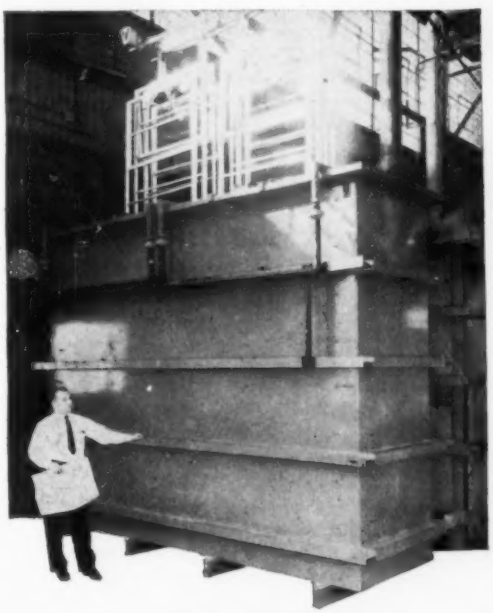
MICHAEL FLYNN MFG. CO., PA.

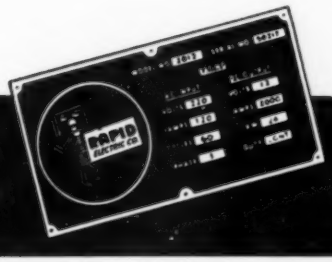
"and that big difference is the accuracy and simplicity in which a pre-determined film thickness can be controlled."

"We chose RAPID ELECTRIC'S Automatic Current Density Control rectifiers to eliminate the problem of estimating current densities with each load change. One setting, and the rectifier automatically maintains a constant current density per square foot of work."

"It's that easy".

"Once more, with the possibility of over-current virtually eliminated, MICHAEL FLYNN'S high standard of quality is assured."





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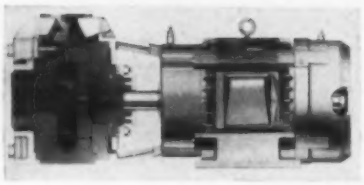


E—1001. Centrifugal Pumps—Three new sizes of corrosion-resistant centrifugal pumps—two with nearly twice the capacity of present models—have been added to the line of Karbate impervious graphite pumps manufactured by National Carbon Co., division of Union Carbide Corp. Increasing use of this motor-mounted type F pump in both the chemical and metal finishing industries has created a demand for a greater capacity range, both in terms of total head and gallons-per-minute ratings.

Known as models 22-FAL, 28-FAL, and 31-FAL, the new pumps are equipped with 1-, 1½-, and 2-hp, 1750-rpm motors. At this speed, the latter two types can deliver up to 150 gal/min.

The two larger pumps are available with 3-/or 5-hp motors for handling fluids of higher specific gravity than water. Maximum total head for each of the new types is 33, 51, and 67 feet, respectively.

The corrosion-resistance of these pumps makes them suitable for a wide range of applications.

E—1002. Rubber Repair Kit—Recently developed and marketed by Automotive Rubber Co., Inc. is the new ARco Rubber Repair Kit for repairing tanks, vessels, fittings, and other rubber lined or covered equipment.

The portable kit makes it possible for on-the-job maintenance and repairs on rubber lined or covered equipment by shop personnel. Simple and complete application instructions plus all the necessary tools and materials are contained in this durable, self-storing kit.

Sheet rubber AR-814 furnished in the kit (10½ sq ft) is specially compounded to resist all solutions normally contained in rubber lined equipment. Sheet rubber AR-814 is 3/16 in. thick and "spark-tested" to insure freedom of voids.

Special Neoprene repair kits are also available on request.

E—1003. Sonics Unit—Detrex Chemical Industries, Inc. have introduced a new ultrasonic cleaning unit which is said to be priced to enable and encourage the small production shops to buy. A unit of this size would be adequate for any operations where small parts must be cleaned by the best known methods.

The new unit is called "Econo-Sonic" and is a complete solvent degreasing unit within itself.

It has boil and rinse chambers, plus complete circulation and filtration. Added is a spray lance to make it even more functional. Included in the package is a 110v-600w-400 KC Detrex generator.

E—1004. Black Treatment—American Buff's research team has developed a new treatment to make cotton or sisal buffs tougher, longer-lasting and more efficient. This system is called the "black treatment."

Thoroughly impregnating the buff fabric, this treatment penetrates every fibre of cotton or sisal, stepping up strength and endurance, permitting longer runs at lower cost, according to the company. Its toughening agent also has two other beneficial aspects.

By bonding fibres more firmly together, it is claimed to eliminate fraying, improve cut and color and prevent streaking. Its slightly "tacky" texture holds buffing compound better, thus requiring less compound to produce a greater volume of output, it is reported.

E—1005. Plating Cylinder—A trussed-rib bolted plating cylinder has been introduced by G. S. Equipment Co.

According to a company official, it is the first cylinder offering the trussed-rib, all-bolted construction for greater strength (275-lb loads), a new high in performance (temperatures to 220F, bussed for 1420 amps, through-cycle), and cost-saving, simplified maintenance (replace any component part in 20 min.) It is recommended for acids, alkalies; electrolytic alkaline descaling, all plating solutions, and other surface treatments.

Cylinder panels are tongue and grooved into heads and heavy 2 in. square ribs; and trussed full-length from head-to-head by 5/16 in. diameter stainless steelrods.

E—1006. Filter Pump—Completely "canned" in one compact unit housing a filter chamber, filter tube, pump and motor making a space-saving and portable solution filter is the new LEI series introduced by Sethco Mfg. Co. This series is for filtering expensive, sensitive, hazardous and critical solutions.

A principal feature of the LEI series is a pump which is inside a motor housing and magnetically driven by the motor. Stuffing boxes, rotary seals, shaft wear, coupling and alignment problems are said to be eliminated. The results are long leak-proof, maintenance free operation. All pumping parts are fabricated of corrosion resistant stainless steel.

In line with the pump and motor is a full-view filter chamber of high temperature epoxy and lucite or epoxy and pyrex. This filter chamber contains one or more filter tubes of multi-layered processed cotton or special dynal yarn, porous stone or porous carbon providing effective depth filtration of solutions down to 1 micron

in size. Gold, silver, palladium precious metals are reclaimed simply by igniting the filter tube.

Rated at 100–150 gallons per hour for Model LEI-10 and 200-300 gallons per hour for Model LEI-20, the pump itself will deliver 1300 gal/hr on open pumping. This high flow can be throttled by means of a pinch valve located after the filter chamber.

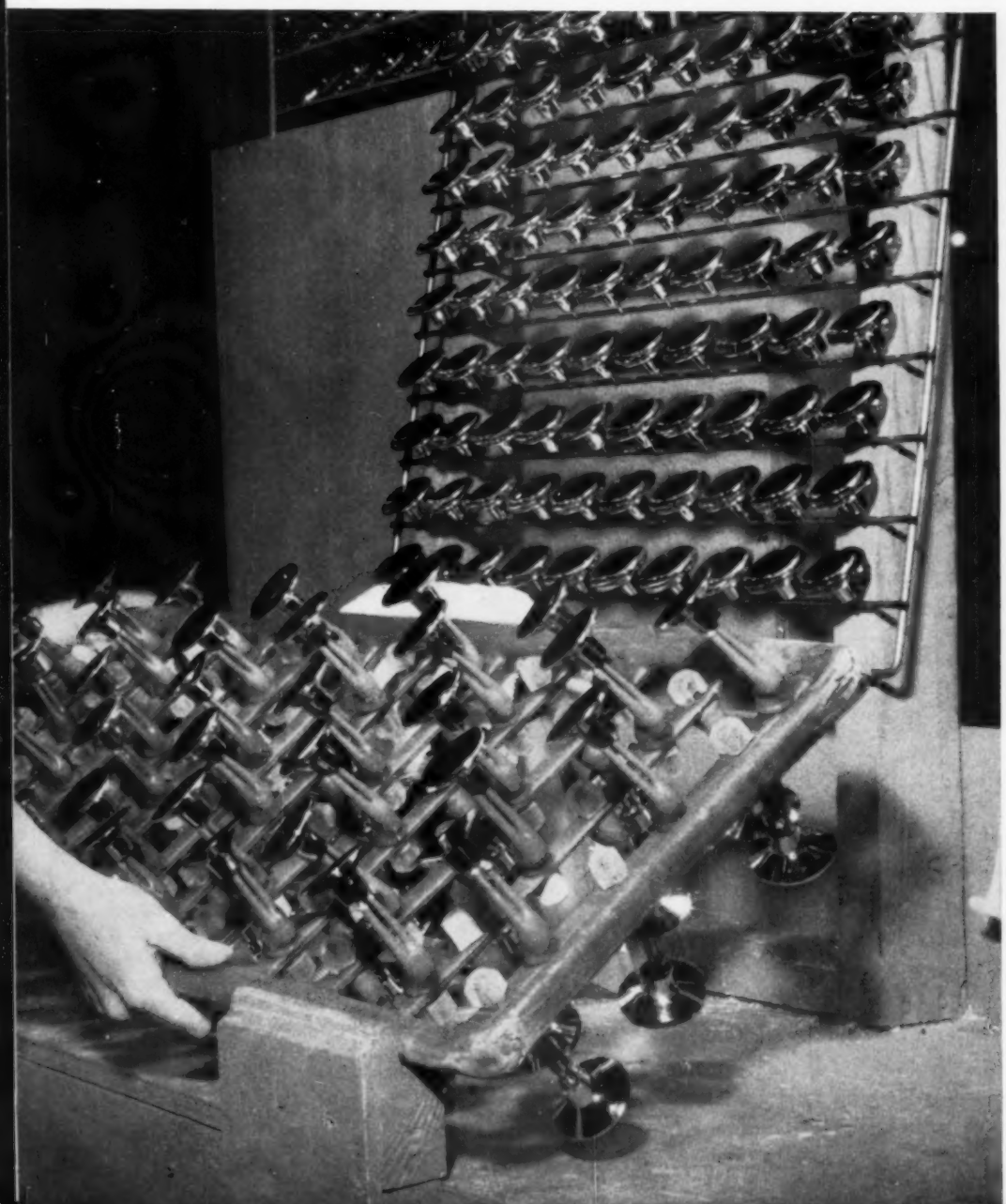
Models LEI-10 and LEI-20 each measure 6½ in. in diameter; and they are 23 and 33 in. in height.

E—1007. Zinc Sulfate—Hummel Chemical Co. is now offering zinc sulfate monohydrate containing approximately 36 per cent metallic zinc.

A technical data sheet and further information are available on request.

Unique new brightener for zinc and cadmium plated parts has been developed by Federated: CONMAX, a conversion coating for plated finishes from brilliant to iridescent, provides corrosion resistant film to zinc and cadmium plate. Other high quality, low-cost brighteners from Federated: ZIMAX for all types of zinc plating, still, automatic, and barrel; CADMAX for cadmium plating; NIMAX, highly concentrated brightener for nickel barrel plating. These brighteners undergo rigid competitive tests before approval for sale. This also applies to Federated's complete line of plating anodes and nickel salts. It's safest when you specify plating supplies from Federated Metals Division of American Smelting and Refining Company, 120 Broadway, New York 5, N. Y. In Canada, Federated Metals Canada, Ltd., Toronto and Montreal.

FEDERATED METALS DIVISION OF



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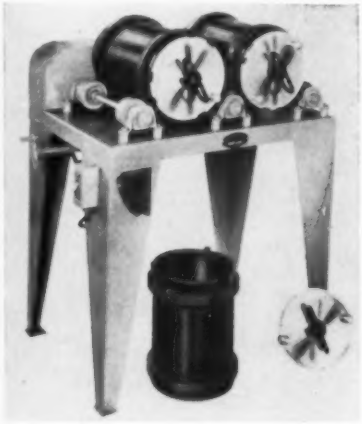
Prepayment Should Accompany All Orders!

E—1008. Barrel Finisher—Globe Barrel Finishing Equipment Div. of Casalbi Co. has introduced a new barrel finishing machine. The principle incorporates a one piece pressure molded rubber barrel, driven on rollers. Because the barrel is molded in one piece, there are no joints or crevices in which particles of abrasive might wedge, contaminating subsequent operations.

The barrel cover is made of aluminum and is quickly detachable with a few turns of the handle. When the handle is locked in position the barrel is claimed to be perfectly water-tight. Inside the barrel are three integrally molded ribs to assist the agitating of parts.

The barrels can be used for all barrel finishing operations: i.e., deburring, descaling, polishing, radiusing, grinding and burnishing.



The unit can be used by experimental departments, pilot plants and production plants. Typical applications are small stamping and screw machine parts, jewelry items, and watch and clock parts.

E—1009. Drum Sander—A split drum sander, which will use low cost strips of coated abrasives, has been introduced to industrial metal working plants by Hargreaves Industrial.

This new abrasive tool has no hinge. The locking cone is a part of the arbor bushing, and the necessity for a backing flange has been eliminated due to the simplified design of the tool. Actually, a backing flange is included with the new sander, but if it were accidentally left off the assembly, no damage would result as long as the wheel is tight against a shoulder on the arbor spindle, according to the company. The pins that secure the abrasive strips have been re-arranged to simplify loading the abrasive strips, and to provide a tighter wrap around the wheel.

E—1010. Plastic Fan—An all plastic fan, one of the largest fans of glass reinforced plastic produced in the USA and known as #36-Rigidon was supplied by Heil Process Equipment Corp. for a metal finishing establishment where ventilation of chemical corrosive fumes was involved. The special conditions required engineering this piece of equipment to handle and resist mixed acid fumes. All parts exposed to the chemicals being exhausted are of solid plastic and no painting is required on any surface, either on the inside or out.

The manufacturer makes a complete series of fans to handle such specialized conditions from size #6 to #42. The larger types #36 and #42 fill a requirement in a number of industries in which fans of this size were previously unavailable in this country.

The #36 fan will handle 27,500 CFM. Other standard plastic fans are available in capacity to 35,000 CFM.

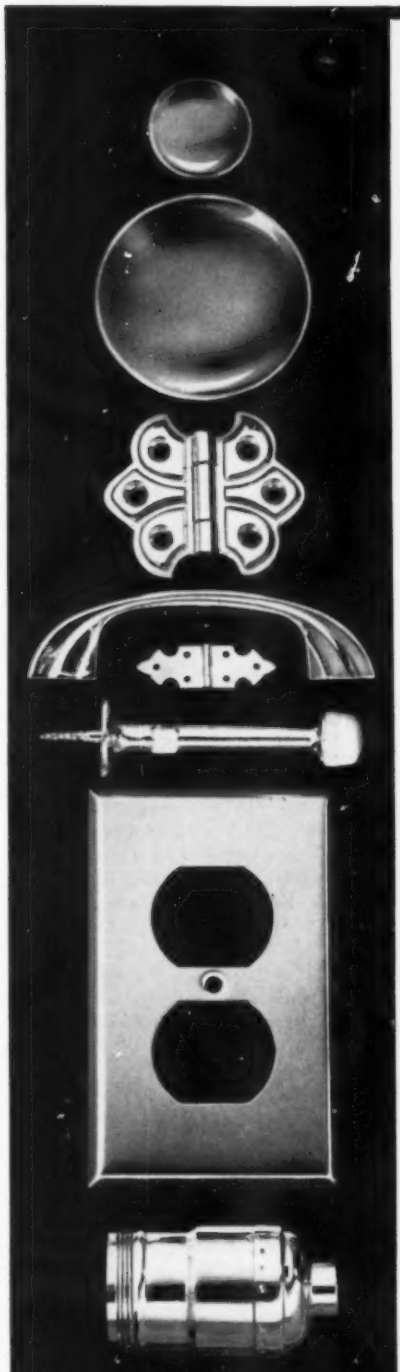
E—1011. Abrasive Buff—American Buff Co. has made available to the metal finishing industry a new type of abrasive buff. Known as the Abrasive Treatment, it contributes two new features to buff types. The first is depth in cut. By thoroughly impregnating the entire buff material, it is reported to efficiently apply cut in depth for uniform cutting surface at any stage of buff wear. Through-and-through abrasive texture also cuts down the need for changeovers, reduces down time and other non-productive costs. The second advantage adds new, super-flexibility which is said to permit buffs to penetrate into crevices, recesses and grooves, and to follow all contours uniformly. This treatment also provides a special texture which holds more buffing compound, affords better buffing action with less waste, resulting in lower finishing costs according to the company.

E—1012. Flatback Paper Tapes—Two new hi-temperature flatback paper pressure-sensitive tapes have been released for sale by Permacel. The two tapes, EM 3979 hi-temp. flatback tape and EM 4082 hi-temp. flexible flatback tape have a specially compounded rubber-resin white adhesive mass.

Both are reported to have excellent high temperature and cold temperature resistance making them ideal for holding and masking during baking operations as well as high hold in cold storage and outdoor exposure.

Another feature of these tapes is their stain resistant adhesive which permits application on enamelled and lacquered surfaces without staining or discoloration.

The tapes can be used with automatic dispensing machinery in high speed production line type operations.



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An investment in a CEC vacuum coater brings big returns three ways:

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3. Lower material costs. Ten cents worth of aluminum will vacuum-plate thousands of parts such as those shown here. Lacquers are relatively inexpensive, too.

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The *decorative* values of vacuum-plated finishes are well known. Now they can be remarkably durable, too. New coatings—recently developed epoxy lacquers, synthetic resins—can preserve those gleaming finishes indefinitely against abrasion, humidity, and other hazards.

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E—1013. Dispersion Coatings—Significant reduction of corrosion costs and increased prevention of contamination in chemical tanks through use of Kel-F brand dispersion coatings, developed by Minnesota Mining and Manufacturing Co., has been reported by Industrial Coatings Corp.

Three major applications were cited by the coatings firm as indicative of areas where the halofluorocarbon dispersions have provided increased release properties and corrosion control at substantial savings in production costs:

Tank linings, particularly where temperature ranges up to 390F and where chemical conditions are too severe for ordinary protective coatings; impellers or agitators, especially in the chemical processing industry where protection against severe chemical attack and product contamination is of utmost importance; rollers used in industry, where, in the majority of cases, the release properties provided by the dispersions are needed.

Chemical resistance of these dispersions for tank linings makes it possible to use caustic-type solutions for tank cleaners without damage to the coating film, according to the company.

E — 1014. Work Holder — Increased polishing and buffing output is claimed with the PG semi-matic work holder manufactured by Divine Brothers Co.

The work holder holds the work against the wheel, turning it and oscillating it across the wheel. The operator simply loads the work, advances it to the wheel, and the holder does the rest.

Some of the design features are drive gears running in a bath of oil; ball bearing slides; vacuum connection without swivel joint; with seals so that the lubricant is not drawn into the air line.

It is furthermore reported that adjustments for spindle height, tilting up or down to 15°, cross traverse, wheel wear, spindle swivel, are provided to increase the efficiency of this machine.

The stroke on the machine is adjustable up to 12 in. maximum, so that work can be buffed wider than the face of the wheel. The stroke action speeds cutting on straight work, and is set at zero when not required.

E—1015. Rinse Additive—Hydrodyne-PR, a liquid additive for plating rinses, drastically reduces or eliminates spotting out on copper and brass plated products, according to Aquadyne Corp., maker of the product.

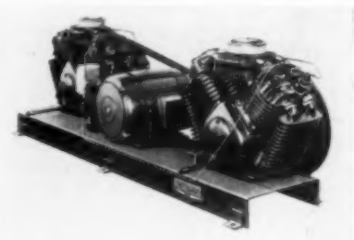
It also shortens rinse time up to 50 per cent and when added to a final hot water rinse, will significantly speed up drying, it is reported. No chromic acid is required in the rinse.

Since the additive is highly concentrated only one part is required for each 1,000 parts of water for effective performance, according to a large manufacturer of brass plated castings. Indications are said to be that a mixing ratio of one part of solution to 1500 parts of water will produce equal results.

E—1016. Olive Drab Coating—Conversion Chemical Corp. has introduced a new olive drab powder coating for cadmium.

This powder when used with a nitric acid adjustment will produce a hard, olive drab deposit on cadmium plated surfaces for corrosion protection. It meets the requirements of Spec. QQ-P-416, Type 2, according to the manufacturer. It may be dyed for coding and identification purposes.

The bath is stable and does not oxidize or deteriorate when not in use, it is reported. Constant color may be maintained. The finish is an excellent base for paint.



E—1017. Air Compressors—The DeVilbiss Co. announces new 20 and 25 hp, 125 and 175 pound air compressors.

Double compressor units, they will displace from 96.4 to 129 ft of air per min. They are equipped with pressure switch and magnetically controlled unloaders. A magnetic starter with selector switch for automatic start-stop operation or constant speed unloading is available as are vertical air receivers for remote installation.

The vee-type multiple-cylinder compressors have a bore in the first stage of 4½ in. and 2½ in. in the second stage. The stroke is 4 in. Length is 88 in., height 28⅜ in. and width 28 in. Domestic shipping weight is approximately 1700 lb and 2000 lb for export.

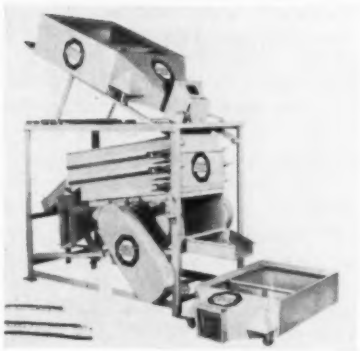
E—1018. AC-DC Voltmeter—A quick means of measuring voltages up to 600 v, AC or DC, is now available through the new portable Columbia Model UV-1 voltmeter which is compactly designed to fit into the palm of the hand. Made of molded plastic material and weighing nine ounces, the Model UV-1 is 2 in. by 2⅞ in. by 4⅝ in. Readings are taken by first inserting the safety plug into a receptacle

on the instrument and then connecting the voltage leads to the line. One lead is equipped with an insulated clip, the other with an insulated prod.

By the use of a rotary switch, the user can select one of four voltage ranges: 0–150 AC, 0–150 DC, 0–600 AC or 0–600 DC. The 0–150 scale with five volt divisions and the 0–600 scale with 20 volt divisions afford ease of reading any voltage from 0 to 600 volts. Accuracy is 2 per cent on DC, 3 per cent on AC (full scale deflection).

E—1019. Stripping Bath—Hampshire Chemical Corp. reports several new developments in Ni-plex, the stripping bath that strips nickel from all basis metals.

The two new bath concentrates have been improved making it possible to present a new package and simplified 1 to 1 mixing ratio. It will now be packaged in two standard sizes of multipac containers for ordering, inventory, and handling economies for their customers. A new technical bulletin is available.



E—1020. Chip Grader—Esbec Barrel Finishing Corp. has introduced their Vibra-Grader for high production parts separating and chip grading.

Its unusual vibratory mechanism is said to make it completely different from conventional shaker-screen units.

The motion prevents stones or parts from lodging in screen openings. This results in far more uniformity of grading than is possible by conventional methods, it is claimed.

One, two or three screens may be used at one time. With three screens in use, it will make as many as four simultaneous separations. It can also be used to separate parts from chips and to size the chips at the same time. The unique action grades chips with great rapidity; 2 to 3 tons per hour. It also avoids violent action which would nick or scratch parts.

A variable speed drive changes the vibration to suit each individual job. Speed of feed from the hopper pan can be controlled to fit the job.

E—1021. Bar Lubricant—AP Lubar is a new all purpose bar lubricant, produced by Lea Manufacturing Co., for use on polishing wheels and abrasive butts. It applies to the belt easily and uniformly leaving an excellent wet surface, it is reported. Loading of packing or abraded particles of metal on the cutting face of belts and polishing wheels is eliminated. Production life of belts and wheels is said to be greatly increased.

Prolonged field tests have production-proved excellent results in polishing ferrous metals and non-ferrous metals—particularly aluminum and other soft metals, according to the company.

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A concentrated liquid additive used at one part to 1,000 parts rinse water *eliminates* spotting out in copper and brass electroplating work.

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Send your order today for one gallon trial $9.95. Five gallon cans @ $9.00 per gallon. 55 gallon drums @ $8.00 per gallon. F.O.B. Clark, New Jersey.

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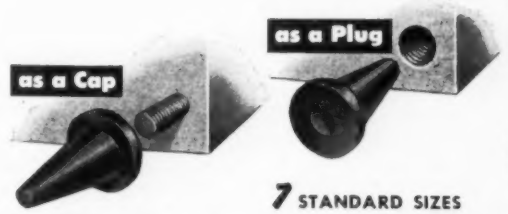

7 STANDARD SIZES

	A	B	C	D	E	F	G
TO PLUG HOLE SIZE	1/8-3/16	3/16-1/4	1/4-5/16	5/16-1/2	1/2-5/8	9/16-11/16	5/8-3/4
TO CAP STUD SIZE	3/32-5/32	5/32-3/16	3/16-1/4	1/4-5/16	5/16-3/8	3/8-7/16	5/16-1/2

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DUGGAN Masking Devices

E—1022. Dry Salt—Enth-Acid 82, a powdered replacement for liquid acids has been introduced by Enthone, Inc., a subsidiary of American Smelting and Refining Company. The new product is a blend of acid salts, activators and surfactants which is said to be very effective for activating iron, steel, brass, copper or zinc base die castings prior to plating. It is also an effective pickling agent for removing rust, heat treating and welding scale from steel.

Acid solutions are easily prepared by dissolving the free-flowing salts in water at concentrations ranging from 4 oz to 3 lbs/gal depending on the application. There are no objectionable fumes attendant with handling or dissolving the salts nor with the operation of the solution at room temperature. The solutions have a high residual acidity which assures the maintenance of the same degree of acidity over a long life span regardless of the amount of work processed.

The company claims that the activators in the salts will produce brighter, cleaner surfaces prior to plating resulting in better adhesion and faster, more uniform bright plating.

E—1023. Strip Coating—Strip-Kote is a milky colored, concentrated plastic emulsion which when dry gives a transparent, tough film for protecting smooth and wrinkled metal finishes, stainless steel, polished aluminum, name plates, glass and plastic surfaces during manufacturing, storage and transit.

It can be applied by brush or spray. The film becomes transparent as it dries. The dried film is permanently flexible.

The emulsion contains no inflammable solvents. The coverage will vary according to the thickness of the dried film deposited. The coverage is 500 sq ft/gal for a 0.004 in. dried film.

E—1024. Processing Lines—A new series of automatic metal processing lines, designed for compact size is now offered by the Metal Processing Department of Pennsalt Chemicals Corp.

These machines wash, rinse, coat and dry steel plates or blanks at processing speeds from 30 to 80 ft/min. They can be used for applying drawing lubricant, for phosphatizing, or for a variety of other metal surface treatments.

Conveyor widths are from 20 to 72 in. Roll spacing permits handling of sheets with minimum length of 30 in.; special spacing allows use of sheet downs to 22 in. wide.

The complete processing line consists of a scrubbing and priming section, a coating section, and a drying section. Sheets move automatically through the system on a line roll conveyor. Coating operation is by roll or spray. When spray is used, the spray guns are adjustable and use air atomization.

MOSCOW CONFERENCE

(Continued from page 1048)

These topics are: the effect of *p*H on the deposition and structure of cobalt, mechanism of chromium deposition, codeposition of molybdenum and tungsten with the iron-group metals, electrodeposition of manganese, adsorption of brighteners by deposits and their effect on crystal structure. Electroless plating was given some emphasis and two reports on their researches were delivered at the convention.

Dr. Vagramyan was a very pleasant personality, modest and unassuming. He is the author of numerous papers on electrodeposition and the author of several books, copies of which he gave to me to bring back. I have not yet the ability to translate them, but hope to learn to read them eventually. On the Sunday following the Conference he brought along his wife and son and took my wife and me on a drive through the suburbs of Moscow, perhaps 30 miles out of town, so that we had a chance to see the countryside, and also to become better acquainted.

The visit to Moscow was well worth the time and effort not only for its scientific value, but also for its personal side. I hope that both countries will make it possible for increasing numbers of scientists to make similar visits; and in particular I should like to have Russian electrodepositors visit this country and to have an opportunity to return the courtesies that I received on my visit.

Remittance must accompany all book orders placed with AES Headquarters.

The Recovery of Embrittled Cadmium Plated Steel by H. H. Johnson, E. J. Schneider, and A. R. Troiano, Case Institute of Technology for Wright Air Development Center, U. S. Air Force. Dec. 1957. 22 pages. Order PB 131654 directly from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., 75 cents.

The baking process used to mitigate hydrogen embrittlement during cadmium electroplating of steel is not always effective. An evaluation reported in this volume of the influence of cadmium electroplate upon the recovery characteristics of hydrogen embrittled steel indicated that the cadmium plate strongly deters hydrogen outgassing upon baking and thus delays recovery. This recovery rate decreases as the plate thickness increases. Other factors of significance concerning the recovery process are also evaluated. Utilizing these results, a new and highly efficient technique for minimizing hydrogen embrittlement was developed. This method is thought to have great potential as a commercial recovery treatment, and should be of particular value in critical applications where maximum corrosion resistance is desired, with a minimum of hydrogen embrittlement and the accompanying susceptibility to brittle delayed failure.

Opportunity to Authors

Member or non-member authors of technical and scientific papers on electroplating, metal finishing and related arts are cordially invited to submit manuscripts of original, unpublished papers to the Editor of PLATING for review and publishing consideration.

Any such paper accepted and published in PLATING will also be eligible, of course, for selection by the Society's Paper Awards Committee for the Carl E. Heussner Award; AES Silver Medal; AES Bronze Medal; George B. Hogaboom Memorial Award; Robert S. Leather Mechanical Finishing Award; Chromium Plating Award; Precious Metal Plating Award, or the John J. Hanney Memorial Award.

So as to expedite review and other processing, please write the Editor, PLATING, 445 Broad Street, Newark 2, New Jersey, for full particulars before submitting your manuscript.

ARTICLE REFERENCES

By
WILLIAM TUCKER
Eastman Kodak
Rochester, N.Y.

Most of the articles listed here may be obtained by writing to the publications in which the articles were published. Addresses are given at the end of the references for the reader's convenience.

Photostat or microfilm copies of articles in available magazines may be obtained from: Library of Congress, Washington, D. C.; New York Public Library, New York; Engineering Societies' Library, New York, at prevailing rates. In other cases, consult Wilson's Union List of Serials at your nearest public library for other sources of these articles.

116. CLEANING

a. *THE PRINCIPLES OF CLEANING BY ULTRASONICS.*
Henry B. Fried.
Ultrasonic News, 2, No. 6 July-August 1958, pp. 8–10.

117. COATING

a. *AN INTRODUCTION TO VACUUM METALIZING.*
M. A. Self and John Scharnberg.
Metal Finishing, *56*, No. 8, August 1958, pp. 54–57.

118. CORROSION

a. *CORROSION AND WATER TREATMENT.*
G. G. Sindery.
Corrosion Technology, *5*, No. 7, July 1958, pp. 209–212.

b. *WATER TREATMENT FOR DOMESTIC HOT-WATER SUPPLIES.*
C. C. Hanson.
Corrosion Technology, *5*, No. 7, July 1958, pp. 220–224.

119. DESIGN FOR PLATING

a. *FIVE RULES TO FOLLOW IN DESIGNING FOR PLATING.*
Materials in Design Engineering, *47*, No. 6, June 1958, pp. 118–120.

120. ELECTROPOLISHING

a. *ELECTROPOLISHING—WHAT, HOW AND WHY.*
John F. Jumer.
Metal Finishing, *56*, No. 8, August 1958, pp. 44–47.

121. EMBRITTLEMENT

a. *NEW TECHNIQUE RIDS PLATED STEEL OF HYDROGEN EMBRITTLEMENT.*
H. H. Johnson, E. J. Schneider and A. R. Troiano.
The Iron Age, *182*, No. 5, July 31, 1958, pp. 47–50.

122. ENGINEERING

a. *WESTERN ELECTRIC'S MODERN METAL FINISHING PLANT.*
A. W. Cagle and E. J. St. Amand.
Metal Finishing, *56*, No. 8, August 1958, pp. 48–52.

123. MISCELLANEOUS

a. *SCIENCE FOR ELECTROPLATERS. 39. ORGANIC ACIDS.*
L. Serota.
Metal Finishing, *56*, No. 8, August 1958, pp. 73–75, 81.

b. *PROTECTION OF MOLYBDENUM FROM OXIDATION AT ELEVATED TEMPERATURES.*
Dwight E. Couch, Harold Shapiro, John K. Taylor and Abner Brenner.
Journal of the Electrochemical Society, *105*, No. 8, August 1958, pp. 450–456.

c. *EXPERIENCES IN ELECTROPLATING AND RELATED PROCESSES.*
J. Chadwick.
Electroplating and Metal Finishing, *11*, No. 7, July 1958, pp. 225–228.

124. ORGANICS

a. *MOTOR BODY FINISHING.*
A. A. B. Harvey.
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PREVIEW OF FUTURE PLATING ISSUES

NOVEMBER 1958
AIRCRAFT. Electroplating and metal finishing in the aviation industry will be featured in this second annual edition.

●

DECEMBER 1958
The always-popular Christmas Issue embellished this year by Golden Jubilee news and features.

JANUARY 1959
ABRASIVES AND MECHANICAL FINISHING. Developments in the various finishing methods will be featured in this annual issue.

●

FEBRUARY 1959
A strong issue presenting technical and scientific articles enriching knowledge in electroplating, metal finishing and allied arts, plus general articles of wide readership interest on the Golden Jubilee generally and, particularly, on the AES's SIXTH INTERIM MEETING and its Golden Jubilee Convention and Industrial Finishing Exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing.

●

MARCH 1959
ORGANIC COATING. The importance of organic finishing to electroplaters is increasing rapidly. New and review material will be presented in this third annual edition.

●

APRIL 1959
RESEARCH ISSUE. A feature will be its documentary section embracing the AES's Research Program in American and Canadian universities and foundations, including an historical summary by Dr. William Blum plus a status report on current research projects by AES's current Vice Chairman for Research. Also other technical and scientific papers plus Golden Jubilee news and developments.

●

MAY 1959
PRE-GOLDEN JUBILEE CONVENTION. A larger than usual issue featuring both technical and scientific papers, together with important coverage of Golden Jubilee Convention, Exposition and International Conference news and data of broad readership importance.

●

JUNE 1959
GOLDEN JUBILEE. A unique feature issue climaxing the Fiftieth Anniversary Observance of the American Electroplaters' Society, PLATING's parent, it will be targeted both for immediate interest to PLATING's global circulation and for long retainment as an AES reference source and as a memento of this year-long observance.

11, No. 7, July 1958, pp. 233–235.

b. ORGANIC FINISHING OF ALUMINUM AND ITS ALLOYS.
Lester F. Spencer.
Metal Finishing, *56*, No. 8, August 1958, pp. 58–61, 69.

125. PHOSPHATING

a. PHOSPHATING TREATMENTS. A COMPREHENSIVE PATENT LITERATURE SURVEY. PART V.
Ervin C. Tinsley.
Metal Finishing, *56*, No. 8, August 1958, pp. 70–72.

126. RACKING

a. PLATING AND ANODIZING RACK DESIGN.
Henry Kraus.
Metal Finishing, *56*, No. 8, August 1958, pp. 62–69.

127. STANDARDS

a. ANODISED ALUMINIUM. A REVIEW OF B.S. 1615: 1958.
Electroplating and Metal Finishing, *11*, No. 7, July 1958, pp. 229–232.

128. WASTE DISPOSAL

a. PLANNING AND OPERATING AN INDUSTRIAL WASTE DISPOSAL PLANT.
G. J. O'Kane.
Products Finishing, August 1958, pp. 38–44.

The following are metallurgical abstracts taken from The Journal of the Institute of Metals, June 1958, pp. 805–806.

LOW-TEMPERATURE CHROMIUM PLATING OF LARGE DIES.
M. E. Gol'dshtein (Stanki i Instrument, 1957, 28, (4), 34–35; C. Abs., 51, 16141). (In Russian).—Plating soln. contg. 250 g CrO_3/l and 3–8 g NH_4F/l permit plating at 15–25C., depositing Cr with a hardness of 67–70 Rockwell C, i.e. the same as produced with conventional H_2SO_4—catalysed soln. The permissible cd increases with increase in NH_4F. With 4 per cent NH_4F the optimum current efficiency of 33 per cent is obtained at 10–13 amp/dm². The electrolyte has a better throwing power than the conventional ones.

THE HARDNESS OF ELECTRODEPOSITED SILVER.
G. Heilmann (Metall, 1957, 11, (6), 515–517) — Vickers microhardness tests on Ag deposits ~40 μ thick, from matte and bright cyanide baths, show that the metal softens on standing. The brightness and the hardness (90–105 kg/mm²) of the deposits—as determined immediately after removal from the bath—increase with increasing cd, temp. and agitation of the bath. Softening of deposits from unagitated baths begins within a few min or a few hr., according to the nature of the deposit, i.e. the softening rate increases with increasing brightness, and after ~24 hr. the hardness is ~40 kg/mm² lower, while a further decrease of ~10 kg/mm² occurs during the course of a year. Deposits from agitated baths soften more slowly, but to a somewhat greater extent during the course of a year. Softening is slower, also, when $Na_2S_2O_3$ is used as a brightener rather than Weiner's patented brightener. There appears to be a relationship between the degree of polarization in the bath and the rate of softening. That softening has hitherto passed unnoticed may be because normal commercial practice of using hot water for rinsing and drying so accelerates softening that it is carried almost to completion during these operations.

PERMANENTLY HARD SILVER ELECTRODEPOSITS.
J. Fischer (Metall, 1957, 11, (6), 485–490)—Modern bright Ag baths produce deposits that are harder than polished matte deposits, but both types of deposit become appreciably softer on standing at room temp. (cf. Heilmann, ibid, p. 515; preceding abstract). Experiments with cyanide baths contg. $KAg(CN)_2$ 54, KCN 70–90, and K_2CO_3 30 g/l, operated at 20–30C and 2–4 amp/dm² show that softening does not occur if ASK brighteners (10 ml/l)—obtained by condensing acrodine with CS_2 or its derivatives, and covered by German patents—are used in conjunction with certain inorganic salts (5–10 g/l of sulphite + fluoride, chloride or iodide, or 30–40 g/l sulphite + chloride + carbonate) or organic compounds (10–40 g/l of hexamethylenetetramine or pentaerythrite). Metallography and X-ray studies show that foreign atoms from these brighteners and addn. agents become incorporated into, and strain, the Ag lattice, thereby markedly raising its recovery and recrystn. temp.

Corrosion Technology
Leonard Hill Technical Group
Stratford House
9 Eden St.
London, N.W. 1
England

Electroplating and Metal Finishing
15 Udney Park Rd.
Teddington, Middlesex
England

Iron Age
Chestnut and 56th Streets
Philadelphia 39, Pa.

J. Electrochemical Society
1860 Broadway
New York 23, N. Y.

J. Institute of Metals
17 Belgrave Square
London, S.W. 1, England

Materials in Design Engineering
430 Park Avenue
New York 22, N. Y.

Metal Finishing
381 Broadway
Westwood, N. J.

Products Finishing
431 Main St.
Cincinnati, Ohio

Ultrasonic News
100 Stevens Avenue
Mount Vernon, N. Y.

PERSONALS

Ernest D. Carr has been appointed a sales engineer in the Metal Finishing Division of Frederic B. Stevens, Inc. of Detroit. Mr. Carr will represent Stevens in Maine, Vermont, Massachusetts, Rhode Island and New Hampshire. He will make his headquarters at the Stevens Branch in New Haven, Connecticut.

Prior to joining Stevens, Mr. Carr spent seven years as a sales engineer for a well known distributor of electroplating supplies in Cambridge, Massachusetts.

He has attended M. I. T. and is a member of the American Electroplaters' Society.

E. D. Carr

Darwin Chester

Darwin Chester has been appointed as a Frederic B. Stevens, Inc., sales engineer.

Mr. Chester has been a service engineer with Stevens since 1957. Prior to that time he spent four and a half years in a similar position with another Detroit metal finishing equipment supplier.

A native Detroiter, Mr. Chester will represent Stevens in certain areas of Michigan and Ohio.

He is a member of the Detroit Branch of the American Electroplaters' Society. During World War II, he spent three years in the Air Force. He will make his headquarters at the Stevens general office at 1800 18th Street, Detroit.

A. A. Milkie has been appointed manager of the Chicago District of the Pangborn Corporation, Hagerstown, Md.

Mr. Milkie has served with Pangborn as a sales engineer in the Chicago district since 1951 and in his new position will direct Pangborn's field engineering service and sales personnel. His headquarters will be at 2435 North Halsted Street, Chicago, Ill.

Raymond Stricklen has joined Aluminum Finishers, Inc. as plant manager. This is a new corporation in Baltimore established to provide finishing services for aluminum such as anodizing, bright dipping, chromate conversion coatings, etc. Electroplated finishes on other metals will be added as the demand arises.

Mr. Stricklen's 20 years of metal finishing experience include electroplating at Revere Copper & Brass, Inc., manufacturing engineering at The Martin Company and development at Allied Research Products, Inc. He is a chemical engineering graduate of International Correspondence School, and a past president of the Baltimore-Washington Branch of the AES.

John R. Hopkins has been promoted to assistant sales manager of Becco Chemical Division, Food Machinery and Chemical Corp.

Mr. Hopkins will have charge of the division's advertising and publicity, as well as assisting Mr. Shutts in the supervision of field sales activities.

He joined Becco in 1935 after attending Princeton University, and served as a technical representative in the southern territory from 1946 until 1955, when he was promoted to assistant manager of the territory.

G. S. Corigliano, manager, advertising and sales-promotion for Sel-Rex Corp., Nutley, New Jersey, will direct a ten-session Industrial Market Development Seminar, co-sponsored by Rutgers University and the New Jersey Chapter of the National Industrial Advertisers Association, this fall at the Newark, N. J., Campus.

As a member of Rutgers University's Marketing Department, Mr. Corigliano reports this course has been designed to offer professional sales, sales management, promotion, advertising and marketing personnel the unique opportunity of discussing their particular problems with acknowledged experts.

Clifford Oates has been appointed technical representative for Connecticut (except Fairfield County) of Magnuson Products Corp., Brooklyn, N. Y. In addition to his experience with Magnuson, Mr. Oates has had long previous connections in the electroplating industry.

William A. Baltzell, formerly assistant sales manager, has been appointed industrial sales manager for Oakite Products, Inc., now in its 50th year. In his new position he will be responsible for the work of the company's 17 divisions and 240 technical service representatives throughout the U.S. and Canada.

Mr. Baltzell joined Oakite's field service staff in 1941. He was appointed southern division manager in 1946, and became assistant sales manager in 1953. He is a member of the board of directors of the company.

W. A. Baltzell

Dr. C. Bremer

Dr. Clarence Bremer, formerly director of research, has been appointed technical director of Oakite Products, Inc. Dr. Bremer will be responsible for the company's research and product development, and technical service laboratories.

A member of the company's board of directors since 1956, Dr. Bremer has been with Oakite since 1942. He is a member of the American Chemical Society, the American Ordnance Association, the American Society for Metals, the National Association of Corrosion Engineers, Institute of Chemists, and Sigma Xi, the national scientific honorary society.

Dr. Hugh Hodge is Oakite's research laboratory manager, and Charles Rack is head of the technical service laboratory.

Norman P. Rowan will be in charge of the Youngstown, Ohio and Pittsburgh, Pennsylvania areas for the Northwest Chemical Co., Detroit with headquarters at 462 Ewing Road, Youngstown 12. Mr. Rowan is a long-time resident of Youngstown and has had special training and broad experience in the metal finishing field.

Richard B. Chalker will represent the Northwest Chemical Co. in the Chicago area, with office address to be announced later. Mr. Chalker is a chemical engineering graduate of Yale University and has had substantial, practical experience in metal finishing.

J. T. ("Joe") Cataldo has been appointed vice president in charge of sales of International Rectifier Corp., El Segundo, Calif.

Mr. Cataldo came to International Rectifier in 1952, as sales manager and assistant general manager. Previously, he was project advisor responsible for research and development activities on metallic rectifiers and other products at the Signal Corps Engineering Laboratories at Fort Monmouth, New Jersey.

Mr. Cataldo holds engineering degrees from Clarkson College of Technology and Brooklyn Polytechnic Institute, and has done graduate work at B.P.I. and Rutgers University. He is a member of the Institute of Radio Engineers, has authored more than 60 papers on theory and applications of metallic rectifiers, and holds several patents.

J. T. Cataldo

J. E. Zane

James E. Zane has been named market development engineer of the American Zinc Institute with base in Detroit.

Mr. Zane's functions are to include technical and educational activities especially related to the promotion of zinc die castings.

Until recently, Mr. Zane served as sales training coordinator with the Edsel Division of Ford Motor Co. where he supervised training programs for several years. During 1954-1956 he was sales engineer and Detroit manager for Lempco Industrial, Inc.

He attended General Motors Institute from 1945 to 1948 as an engineering student and has also engaged in administrative studies at Purdue University.

Mr. Zane will make his headquarters at 54 Easton Avenue, Detroit 3, Michigan.

Arthur I. Mendolia, an assistant director of sales of the Du Pont Company's electrochemicals department, has been named assistant general manager of the department.

He succeeds **W. Samuel Carpenter 3d,** who became general manager of the company's international department which was designated an industrial department.

Mr. Mendolia, 41 years old, has had extensive experience in research, production, and sales work in the electrochemicals department. He received a BS degree in chemical engineering from Case Institute of Technology.

Starting in 1941 as a chemist at the Niagara Falls, N. Y., laboratory, he went into production work in 1943 as a process development engineer and became assistant process supervisor of chlorine products two years later.

In 1946 he was placed on special assignment. In 1948, he was made a development group leader, then senior production supervisor, and finally, superintendent of the furfural products area.

He was appointed technical superintendent of the east plant in 1952, and was transferred to Wilmington in August, 1954, as assistant director of research. On April 1, 1956, he became an assistant director of sales.

Fred C. Hoehn and **John S. Robinson** have been appointed sales representatives for Becco Chemical Division, Food Machinery and Chemical Corp., Buffalo, N.Y.

Mr. Hoehn will be serving customers in the Midwest territory, traveling out of the Decatur-Springfield, Illinois, area. He is a graduate of Buffalo State Teachers College and has been with Becco since 1956.

Mr. Robinson has been assigned to the New England territory, and will work out of Becco's district office in Framingham, Mass. He joined Becco in 1940 as a laboratory assistant, and later was promoted to research chemist.

William H. McConnell, vice president—sales since 1953 and a veteran of 30 years' service in sales work with the Diamond Alkali Co. is now vice president—marketing. He will focus his attention primarily on the expanding requirements of marketing and sales management, as well as other general management responsibilities.

A director of the Chlorine Institute, Inc. for the past several years, McConnell was named vice president of this national organization in 1956 and became its president earlier this year.

Hollis B. Cranmer has joined the Metals division of Olin Mathieson Chemical Corp. as manager of aluminum distributor sales for Olin Aluminum. He had been vice

MANUAL AVAILABLE TO BRANCHES

As a reference source to help Branches and Branch officers in effective Branch operation, many dedicated National and Branch leaders collaborated, without any remuneration, in preparing the comprehensive BRANCH OFFICERS MANUAL of the American Electroplaters' Society, embodying practically every conceivable Branch operating subject from membership promotion to Delegates' duties.

Within red covers bound by Chicago screws, this 225-page consolidated mimeographed looseleaf book is now in use in 36 AES Branches that ordered copies.

A limited extra quantity of the book is still available at National Headquarters for the accommodation of Branches that have not previously ordered copies. These will be sold to Branches (only), on a first-come, first-served basis so long as that supply lasts, at $5.50 per copy, including postage to one destination.

Write American Electroplaters' Society, Inc., American Building, 445 Broad Street, Newark 2, N. J. Payment should accompany order to obviate unnecessary bookkeeping expense.

president and general manager of Eastern Metal Mill Products Company, Inc., Boston.

Prior to that he had been with Revere Copper and Brass, Incorporated, in New England. While with Revere, he served successively as sales representative, New Bedford, Mass.; industrial sales engineer, Boston; and New England distributor sales manager, Boston.

Jerome Fuchs has been appointed manager of systems and procedures for American Metal Climax, Inc.

Mr. Fuchs was formerly in the same position with Pennsalt Chemicals Corp.

He attended Austin College in Texas, Sampson College in New York, and received his Bachelor and Master degrees from Syracuse University.

He served as a navigator and tactical officer with the USAF during World War II. Mr. Fuchs and his wife and three children will make their home in Massepequa, L. I.

Jerome Fuchs

D. H. Ross

Daniel H. Ross has been named a sales trainee by MacDermid Incorporated, Waterbury, Conn., as part of an intensified expansion program in both plant facilities and staff. Mr. Ross will receive training in the company's laboratory where metal finishing chemicals and compounds are tested under actual production conditions. Following this tour of duty, the new sales trainee will be assigned to work with a MacDermid representative for additional training in the field.

Mr. Ross attended Wayne University and the University of the Philippines. He served three years in the U. S. Army, two years of which were spent in the Philippine Islands. Before joining MacDermid Incorporated, Mr. Ross was employed as a sales and service representative of the Promat Division of Poor & Co. Prior to that, he was a general customer service man with Ross Industries, Detroit, Michigan.

Thomas S. McCrory has been appointed regional manager of Wheelabrator Corporation's West Coast sales organization. Mr. McCrory will make his headquarters in Los Angeles, supervising Wheelabrator's present Seattle, San Francisco, and Los Angeles territories.

Mr. McCrory served for 32 years in the United States Navy and attained the rank of Lt. Commander. During this time he gained manufacturing and metal working experience at the Naval Gun Factory in Washington, D. C. and at the Naval Ordnance Plant in Charleston, South Carolina.

In 1952 he joined the Baldwin-Lima-Hamilton Corp. He was western sales manager of their Niles Tool Division before joining Wheelabrator.

Edward M. Roth Jr. has been named manager of the Upper New York sales territory of Becco Chemical Division, Food Machinery and Chemical Corp. Mr. Roth's headquarters will be at Becco's main plant, on Sawyer Avenue, Tonawanda, N. Y.

A graduate of Canisius College, Mr. Roth joined Becco in 1936 and was a research chemist until 1955 when he became a sales representative. In this capacity he has worked in the Upper New York sales territory and has served as assistant manager of the New York-Philadelphia sales territory.

Series 105

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6. Is it insoluble in aliphatic alcohols, glycol and glycerine?	☐	☐
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Don Volino has been appointed eastern division sales manager for the 82-year-old firm of Maas & Waldstein, Newark, New Jersey.

Mr. Volino, for many years a resident of Haddonfield, New Jersey, now lives in Short Hills, New Jersey.

Formerly with the General Electric Co., Mr. Volino brings many years of experience in application and use of lacquers, enamels and synthetics to his new post. As a member of RCA-Victor's Standardization Division, he was also responsible for standardizing finishes on RCA products.

Mr. Volino joined Maas & Waldstein in 1950 as technical sales representative. He is a member of both the American Electroplaters' Society and the American Ordnance Association.

Don Volino

E. Fioramonti

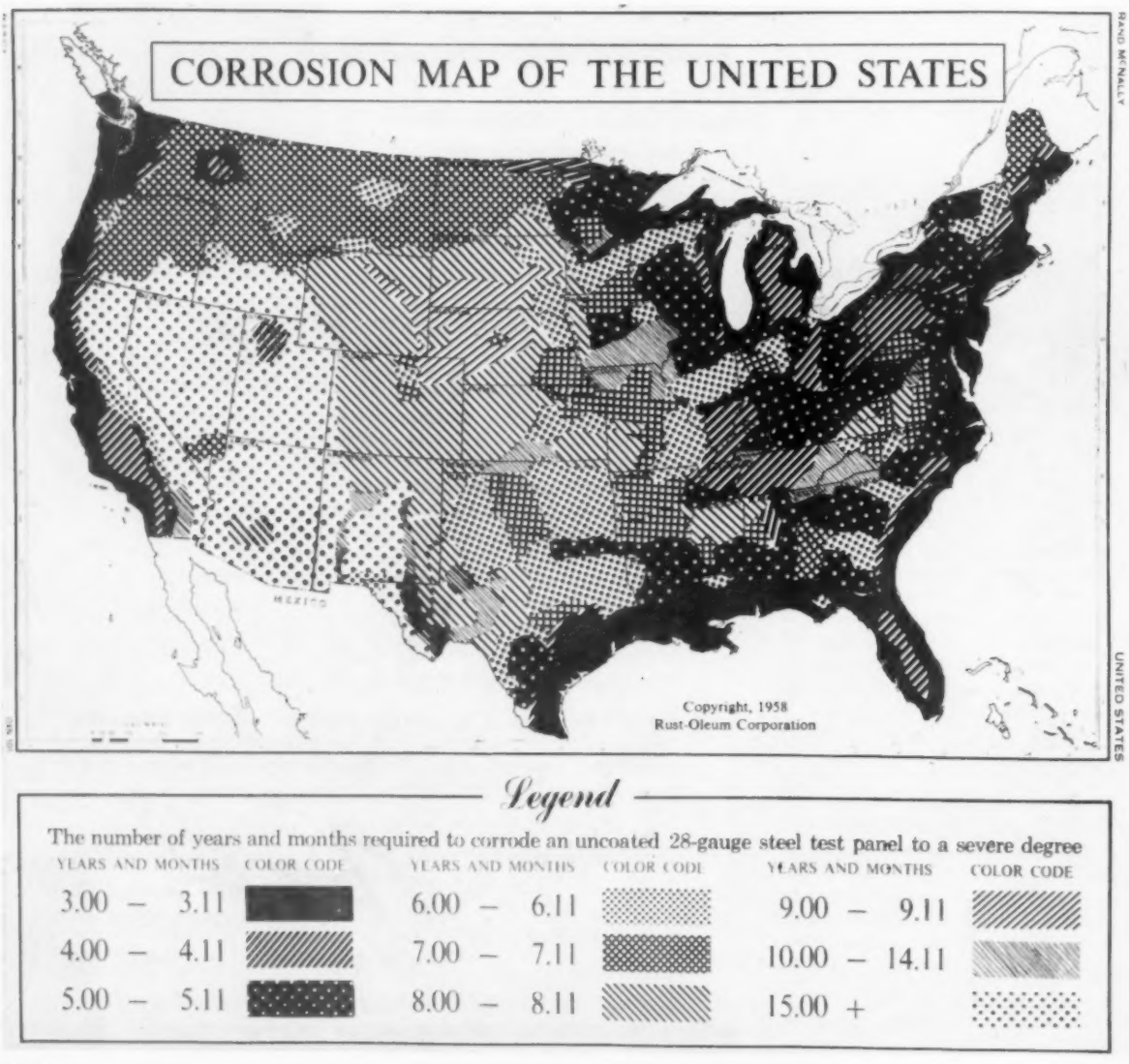
Eugene Fioramonti has been named western regional sales manager of The Narda Ultrasonics Corp., Westbury, N. Y.

Mr. Fioramonti will direct and coordinate the sales activities of a prominent group of distributors and representatives. A Narda sales office and warehouse will be established in Los Angeles.

Jack D. Little has joined Incar, Inc. of Cleveland, Ohio, as vice president—sales

Mr. Little was formerly associated with the McGean Chemical Co. as manager of technical sales. Prior to his association with McGean, Mr. Little served Harshaw Chemical Co. in various capacities as manager of technical service, manager of technical sales and assistant manager of research and development. Mr. Little holds many patents in the electroplating field.

Incar, Inc. is well known in the plating industry through its bright zinc and cadmium processes distributed through Federated Metals Division of American Smelting and Refining Co. Mr. Little will direct the sales activities including expansion of the product line.



Legend

The number of years and months required to corrode an uncoated 28-gauge steel test panel to a severe degree

YEARS AND MONTHS	COLOR CODE	YEARS AND MONTHS	COLOR CODE	YEARS AND MONTHS	COLOR CODE
3.00 – 3.11		6.00 – 6.11		9.00 – 9.11	
4.00 – 4.11		7.00 – 7.11		10.00 – 14.11	
5.00 – 5.11		8.00 – 8.11		15.00 +	

John D. MacKenzie has been elected chairman of the board of American Smelting and Refining Co. to fill the vacancy caused by the death of the late Kenneth C. Brownell. Mr. MacKenzie will continue as president of the company.

A native of Pembina County, North Dakota, Mr. MacKenzie joined Asarco in 1920 as a chemist at the company's Garfield, Utah smelter. He rose through the ranks to become vice president in charge of smelting operations in 1948, and was elected a director in 1949. He became president in April of this year.

Mr. MacKenzie also serves as a director of Revere Copper and Brass, Inc., General Cable Corp., Southern Peru Copper Corp. and Western Phosphates, Inc.

Russell Miller is the new director of research of the Promat Division, Poor and Co., Waukegan, Ill. He is a graduate of Armour Institute of Technology (now Illinois Institute of Technology) where he majored in chemical engineering. Mr. Miller organized the chemistry and testing laboratories at the Central Division of Stewart-Warner Corp., and was in charge of its buffing, polishing and plating units prior to his acceptance of his new position.

John MacKenzie

Russell Miller

Jack M. Price has been appointed assistant sales manager of the Metalworking Chemicals Division of Amchem Products, Inc. He will assist in the operation of the Central sales office and in the direction of the Central staff and field sales activities.

Mr. Price originally joined Amchem as a sales representative in their New England territory. In 1954 he was appointed assistant manager, Eastern District and moved to the home office in Ambler. In May 1956 he was transferred to the Central sales staff, also in Ambler, as assistant to the sales manager.

Dr. Walter Welkowitz has received appointment as director of engineering for the Vibro-Ceramics Division, Gulton Industries, Inc.

Dr. Welkowitz joined the company in 1955. His current duties will include the direction of all engineering and research activities in the fields of industrial ultrasonics.

He received his BS degree from Cooper Union College in New York and his MS and PhD degrees from the University of Illinois in electrical engineering.

Dr. W. Welkowitz

C. B. Persons

C. Berton Persons has been named representative for the Industrial Division, Metalwash Machinery Corp., Elizabeth, N. J. In his newly created post, Mr. Persons will represent the company in the greater Cleveland area.

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PLATING MAGAZINE
JUNE 1959

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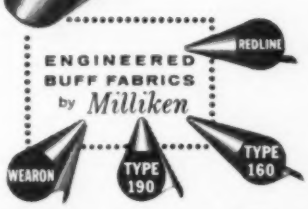

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PATENT ABSTRACTS

(*Continued from page 1066*)

0.3 to 5.6 g/l of iron ions, 0.03 to 1.25 g/l of zinc ions and a disulfonated benzopyrone in the amount of 1 to 10 g/l of coumarin disulfonic acid. In the body of the specification considerable leveling is described as possible.

8 claims.

No. 2,840,518, 6/24/58—Acid Copper Addition Agents—J. Condon, assignor to Westinghouse Electric Corp., E. Pittsburgh, Pa.

The addition agent for an acid copper bath described as yeast protein autolysate (0.005 to 0.2 oz/gal) obtained as the result of proteolytic enzymes acting upon yeast.

8 claims.

No. 2,840,523, 6/24/58—Lead Anode for Chromium Plating—W. Cibulskis, et al, assignors to Metal and Thermit Corp., New York, N. Y.

The single claim is: "An insoluble lead anode for a chromic acid chromium plating bath, comprising an upper portion of copper, an elongated lower portion of lead, and an intermediate portion of lead joining the upper and lower portions, the upper portion being integral and having a hook at its upper end and an enlarged conical portion at its lower end and a shank intermediate the hook and enlarged conical portion, the intermediate portion being cylindrical and the enlarged conical portion being coaxial with and disposed entirely within the intermediate portion, the lower portion having a thickness in any lateral direction less than the diameter of the intermediate portion, the shank of the upper portion being inclined from the common axis of the enlarged conical portion and the intermediate portion and joining the enlarged conical portion at an obtuse angle, and a sleeve integral with the intermediate portion and of less diameter than the intermediate portion, the sleeve being inclined with the shank from the axis of the intermediate portion and enclosing a portion of the shank.

No. 2,841,538, 7/1/58—Recovery of Uranium—R. Porter and E. Pinkney, assignors to Union of South Africa (AEB).

Electrolyze in the presence of carrier (Cu, Cd, Ni, Au, Ag, Zn, Bi, Sb, As, Fe and anions ($PO_4^{=}$, $AsO_4^{=}$, OH^-, $CO_3^{=}$) wherein the metal is deposited at the negative electrode in a finely divided state and the uranium is deposited in a combined form.

7 claims, figure.

No. 2,841,539, 7/1/58—Heat Treatment of Electroplated Uranium—P. Hoglund, assignor to U.S.A. (AEC).

Plate with copper or nickel, followed by a low melting metal (Sn, Zn) and place in a liquid organpolysiloxane and heat at 250 to 300C.

4 claims.

No. 2,841,540, 7/1/58—Chromium Plating—R. Smith, assignor to Diamond Alkali Co., Cleveland, Ohio.

As an addition agent for chromic acid baths is described as the reaction product of a chromium compound (CrO_3) an organic reducing agent (glucose) and fluosilicic acid. The amount used is given as 0.5 to 7 g/l.

See also No. 2,841,541, by same inventor.

11 claims, figure.

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1084 USE READER SERVICE CARD; INDICATE A 1051.

No. 2,841,547, 7/1/58—Electroplating Apparatus—P. Kotz, et al, assignors to Belke Mfg. Co., Chicago, Ill.

Claim 1 is as follows: "An electroplating apparatus comprising a tank for electrolyte, a bus bar having electrical connections to carry current to anodes, said bus bar extending across the top of the tank, near one side wall of the tank, a plurality of anodes depending from said anode bus bar, each anode comprising a depending plate having a hook at its upper end mounted on the bus bar, and each anode having a horizontally extending plate carried by the anode to extend over the work pieces to assure current distribution through the electrolyte to them, a cathode bus bar carried by the top of said tank and supported at its ends by an electric vibrator carried by the tank by means of resilient cushions to permit free vibration of the latter bus bar, a work supporting tray comprising a pair of vertically extending bars having hooks at their upper ends mounted on said vibrating bus bar and having means for securing the hooks to the latter bus bar to prevent relative motion, the work supporting tray comprising a rectangular member, the end walls of which are secured to said vertical bars to support the tray beneath the horizontal plates of the anodes, said tray having a mesh bottom for free access of electrolyte through the bottom to the work pieces carried thereby, the said horizontal plates being provided with a multiplicity of apertures for discharging upwardly bubbles of gas formed on the lower side of said horizontal plates during the electroplating operation, a source of energization of alternating current for said electric vibrator, including an electric circuit, said electric circuit also including an electric timing device adapted to repeatedly turn on the electric vibrator for a sufficiently short period of time to change the positions of the pieces and adapted to repeatedly turn off the electric vibrator over a longer and major period of time during which most effective electroplating takes place.

5 claims.

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BRANCH NEWS

Total AES Branches U. S., Canada Australia, September 1, 1958—58.

DETROIT

Branch Executives, Committee Chairmen, Exposition and Convention Group Meet

Manuel Ben, president of the Detroit Branch of the American Electroplaters' Society, called a meeting of the Branch Executives and Committee Chairmen which was held on Friday, August 22, at the Statler Hilton Hotel.

Of particular interest was the report of **Vincent Cassidy,** chairman of the Education Committee, on the plans for the 1958–59 program. Mr. Cassidy's program activities start in December and extended through May as **Doug Thomas** continues as Education Chairman through September, October and November of 1958. Chairman Cassidy together with Chairman Thomas described a completed program which could be immediately publicized to the Detroit membership.

Donald Bigge, chairman of the Membership Committee, reported on the roster and booklet for this coming year.

Carl Durbin, chairman of the December Party, described the several innovations for the 1958 party and received official approval of his plans. The December Party will be limited to approximately nine hundred guests. The tickets will be furnished to AES members only on the basis of two tickets per Detroit member and, if there are some tickets available, to members of other branches after November 1.

Wright Wilson, General Convention chairman, reported on the progress of the planning for the convention and **Howard McAleer,** Exposition chairman, reported on the continuing good sales of space for that Exposition.

In addition to the Exposition Group and Committee Chairmen there were in attendance **Lee Morse,** National Delegate, and **Herb Head,** National AES President.

R. C. Trees
Chairman
Public Relations Committee

MIAMI

Dent Entertains with South American Slides

The August 22 meeting was held at Jerry's Restaurant. After dinner, President **Dent** showed slides taken of his trip through South America. Included, were many good shots of the new plating shop his company, Pan American Airways, is building in Brazil.

Discussion ensued concerning the 1959 technical session of the Dixie region, which will be held in Miami.

Fred Fulforth of Metal and Thermit was present at the meeting and disclosed to the members that he had just purchased a home in this area.

Robert F. Wharton
Librarian

BRANCH SECRETARIES

Branch News is required of all Secretaries monthly by AES Bylaws. First of the month is Branch News deadline for next PLATING issue. Any items on hand on that date will be carried in that edition. Later arrivals will appear in the issue immediately following. In reporting talks given by speakers before the Branch, please give titles of the talks, the speakers' full identification and any other pertinent information of interest to other Branches and PLATING's broad readership.

BRANCH DIRECTORY CHANGES

BALTIMORE-WASHINGTON

Secretary: Harold W. Scott
448 Munson Hill Road
Falls Church, Virginia

Meeting Place: Chemistry Bldg. Nat. Bureau of Standards, Washington D.C. Stafford Hotel, Baltimore, Md.

Day of Month. Second Tuesday
Time: 8:00 p.m.

BLUE-RIDGE

Secretary-Treasurer: Carl A. Witherspoon
Box 286
Blacksburg, Virginia

Meeting Place: Roanoke, Blacksburg, Winston-Salem, Greensboro, Lynchburg.

Day of Month: First Friday
Time: 6:30 p.m.

CAPITOL DISTRICT

Secretary- William R. Allison
237 Gifford Road
Schenectady, New York

Meeting Place: Hot Shoppe, Albany, New York

Day of Month: 1st Monday
Time: 7:00 p.m.

CHICAGO

Day of Month: 1st Friday
Time: Dinner 6:15—Bus. Meeting 7:15 p.m.

INDIANAPOLIS

Secretary: Addison Howard
169 N. Indiana
Mooresville, Indiana

Day of Month: 1st Monday of Month
Time: Dinner 6:30, meeting 8 p.m.

LOUISVILLE

Secretary: Harold G. Peters
2206 Sherwood Ave.,
Louisville 5, Kentucky

MONTREAL

Secretary, Correction in spelling, R. W. Niggeman

PROVIDENCE-ATTLEBORO

Secretary: Edward G. Amesbury
35 Rocklawn Avenue
Attleboro, Masschusettes

SAGINAW VALLEY

Secretary: Leo C. Mangett
G. 4075 Risedorph
Flint 6, Michigan
Meeting Time: 6:45 p.m.

SEATTLE-PUGET SOUND

Secretary: Mrs. Helen Archibald
17814 Palatine
Seattle, Washington

SOUTHEASTERN

Secretary: H. R. Stogner, Sr.
3019 Tilson Road
Decatur, Georgia

SOUTHERN TIER

Meeting Place: Carlton Hotel, Binghamton, New York

Day of Month: 3rd Tuesday
Time: 7:15 p.m.

TORONTO

Secretary: R. H. Clark
262 Woburn Avenue
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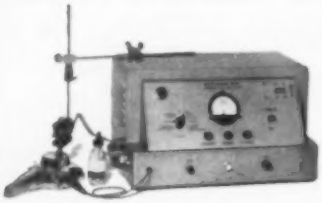

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FUTURE MEETINGS

AMERICAN ELECTROPLATERS' SOCIETY

Oct. 31-Nov. 1	**Philadelphia Branch,** Annual Educational Session and Banquet, Hotel Sheraton, Philadelphia, Pa.
December 5–6	**Detroit Branch,** Annual Educational Session and Banquet, Hotel Statler Hilton, Detroit, Mich.
December 12–13	**Newark Branch,** Annual Educational Session and Christmas Party, Hotel Robert Treat, Newark, N. J.
December 20	**Buffalo Branch,** Annual Christmas Party, Niagara Manor, Buffalo, N.Y.
January 17, 1959	**Grand Rapids Branch,** Annual Educational Session and Banquet, Pantlind Hotel, Grand Rapids, Mich.
January 31, 1959	**Chicago Branch,** Annual Meeting and Banquet, Conrad Hilton Hotel, Chicago, Ill.
January 31, 1959	**Cleveland Branch,** Annual Educational Session and Dinner-Dance, Cleveland, Ohio.
February 7, 1959	**New York Branch,** Annual Educational Session and Banquet, Hotel Statler Hilton, New York, N. Y.
February 13–14, 1959	**Dixie Regional Group,** Educational Session and Banquet, Southeastern Host Branch, Dinkler Plaza Hotel, Atlanta, Ga.
February 14, 1959	**Sixth Interim Meeting,** Dixie Regional Group Sponsor, Southeastern Host Branch, Dinkler Plaza Hotel, Atlanta, Ga.
March 7, 1959	**Rockford Branch,** Annual Educational Session and Banquet, Faust Hotel, Rockford, Ill.
March 7, 1959	**Dayton Branch,** 13th Annual Meeting and Dinner-Dance, Dayton, Ohio.
April 4, 1959	**Fifth Tri-State Regional,** Louisville Host Branch, Louisville, Ky.
April 11, 1959	**Baltimore-Washington Branch,** Annual Banquet and Dance, Presentation of Pot, Washington, D. C.
April 11, 1959	**Empire State Regional,** Buffalo Host Branch, Hotel Peter Stuyvesant, Buffalo, N. Y.
April 18, 1959	**Twentieth New England Regional,** Waterbury Host Branch, Hotel Statler, Hartford, Conn.
April 25, 1959	**Milwaukee Branch,** Annual Meeting and Banquet, Schroeder Hotel, Milwaukee, Wis.

(Continued)

June 15–19, 1959—Golden Jubilee Convention and International Exposition, Including Fifth International Conference on Electrodeposition and Metal Finishing, Convention Headquarters—Hotels Statler Hilton and Sheraton-Cadillac, Exposition—Artillery Armory, Detroit, Mich.

July 10–14, 1960—47th AES Annual Convention, Hotel Statler, Los Angeles, Calif.

June 18–23, 1961—48th AES Annual Convention, Hotel Statler, Boston, Mass.

June 25–28, 1962—49th AES Annual Convention, Schroeder Hotel, Milwaukee, Wis. Sponsorship Midwest Regional Council.

June 24–27, 1963—50th AES Annual Convention, Ambassador Hotel, Atlantic City, N. J. Sponsorship Newark Branch.

INTERSOCIETY

October 27–31—40th National Metal Exposition and Congress, Sponsored by American Society for Metals, Cleveland Public Auditorium, Cleveland, Ohio.

November 5–6—Society of Vacuum Coaters, Fall Conference, Hotel Statler Hilton, Detroit, Mich.

November 18–20—9th National Conference on Standards, American Standards Association, Hotel Roosevelt, New York, N. Y.

November 18-20—National Conference on Air Pollution, Sheraton-Park Hotel, Washington, D. C.

January 27–30, 1959—Society of Plastics Engineers, 15th Annual Technical Conference, Hotel Commodore, New York, N.Y.

February 2–6, 1959—American Society for Testing Materials, Committee Week, Penn-Sheraton Hotel, Pittsburgh, Pa.

March 16–20, 1959—11th Western Metal Exposition and Congress, American Society for Metals and other technical groups, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles, Calif.

March 17–19, 1959—National Association of Corrosion Engineers, 15th Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill.

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May 3–7, 1959—The Electrochemical Society, Spring Meeting, Sheraton Hotel, Philadelphia, Pa.

June 21–26, 1959—American Society for Testing Materials, 62nd Annual Meeting, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J.

October 11–16, 1959—American Society for Testing Materials, Pacific Area National Meeting (with Exhibit), Sheraton-Palace Hotel, San Francisco, Calif.

October 18–22, 1959—The Electrochemical Society, Fall Meeting, Deshler-Hilton Hotel, Columbus, Ohio.

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